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UCRL-21008 Vol. 2, Part 2
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Evaluation of Military Field-Water Quality

Volume 2. Constituents of Military Concern from Natural and Anthropogenic Sources

Part 2. Pesticides

R. Scofield
J. Kelly-Reif
F. Li
T. Awad
W. Malloch
P. Lessard
D. Hsieh

January 1988

Lawrence Livermore National Laboratory

Supported by
U.S. Army Medical Research and Development Command
Fort Detrick, Frederick, MD 21701
Project Order 82PP2817
Project Officer: Dr. Stephen A. Schaub

DISCLAIMER

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UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS -----
2a. SECURITY CLASSIFICATION AUTHORITY ----- 2b. DECLASSIFICATION/DOWNGRADING SCHEDULE -----	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited
4. PERFORMING ORGANIZATION REPORT NUMBER(S) UCRL-21008 Vol. 2, Part 2	5. MONITORING ORGANIZATION REPORT NUMBER(S) -----
6a. NAME OF PERFORMING ORGANIZATION Lawrence Livermore National Laboratory 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION U.S. Army Biomedical Research and Development Laboratory
6c. ADDRESS (City, State, and ZIP Code) Environmental Sciences Division P.O. Box 5507 (L-453) Livermore, CA 94550-0617	7b. ADDRESS (City, State, and ZIP Code) ATTN: SGRD-UBZ-C Fort Detrick (Bldg. 568) Frederick, MD 21701-5010
8a. NAME OF FUNDING/SPONSORING ORGANIZATION U.S. Army Medical Research and Development Command 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER Army Project Order 82PP2817
8c. ADDRESS (City, State, and ZIP Code) Fort Detrick Frederick, MD 21701-5012	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. 62787A; PROJECT NO. 3M1-62787A875; TASK NO. AG; WORK UNIT ACCESSION NO. DA300881

11. TITLE (Include Security Classification)
Evaluation of Military Field-Water Quality. Volume 2. Constituents of Military Concern from Natural and Anthropogenic Sources. Part 2. Pesticides

12. PERSONAL AUTHOR(S)
R. Scofield, J. Kelly-Reif, F. Li, T. Awad, W. Malloch, P. Lessard, D. Hsieh

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM 5-86 TO 1-88	January 1988	191

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Screening methodology, military, field water, pesticides, health and organoleptic effects.
24	07		
06	11		

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

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As a result of the investigation, we found that pesticide contamination of large bodies of water (e.g., lakes, rivers, and oceans) is generally not at levels that threaten
(continued on next page)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL Mary Frances Bostian	22b. TELEPHONE (Include Area Code) 301-663-7325 22c. OFFICE SYMBOL SGRD-RMI-S

DD Form 1473, JUN 86 Previous editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

troop health or performance. Consequently, foreign water supplies need not be routinely treated specifically to remove pesticides. The greatest threat to troop health from pesticides in water appears to come from infrequent, transient occurrences of extreme contamination, particularly in small bodies of water with little potential for dilution.

Because severe contaminations are known to occur, and because they would seriously affect the health and performance ability of troops, it is recommended that the military develop field techniques to detect certain classes of pesticides and selected individual pesticides. Because pesticide-contaminated water may be the only available source of drinking water, it is also recommended that the treatability of pesticides in water be investigated. It must be recognized that, by accident or intent, any pesticide can be present in water at levels that would render water unacceptable for use. However, lindane is the pesticide that appears the most likely to be found at dangerous levels in water as a result of its normal use. The most widely used organophosphates (e.g., malathion and parathion) appear to present a less likely hazard, but these compounds should also be considered for the development of detection techniques and for treatability studies.

This report is the second part of the second volume of a nine-volume study entitled Evaluation of Military Field-Water Quality. The first and third parts of this volume address organic chemical contaminants and inorganic chemicals and physical properties, respectively. Titles of the other volumes are as follows: Vol. 1, Executive Summary; Vol. 3, Opportunity Poisons; Vol. 4, Health Criteria and Recommendations for Standards; Vol. 5, Infectious Organisms of Military Concern Associated with Consumption: Assessment of Health Risks, and Recommendations for Establishing Related Standards; Vol. 6, Infectious Organisms of Military Concern Associated with Nonconsumptive Exposure: Assessment of Health Risks, and Recommendations for Establishing Related Standards; Vol. 7, Performance Evaluation of the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU): Reverse Osmosis (RO) Components; Vol. 8, Performance of Mobile Water Purification (MWPU) and Pretreatment Components of the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU) and Consideration of Reverse Osmosis (RO) Bypass, Potable-Water Disinfection, and Water-Quality Analysis Techniques; and Vol. 9, Data for Assessing Health Risks in Potential Theaters of Operation for U.S. Military Forces.

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Part 2. Pesticides

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January 1988

Supported by
U.S. Army Medical Research and Development Command
Fort Detrick, Frederick, MD 21701

Project Order 82PP2817

Project Officer: S. A. Schaub

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FOREWORD

This report is the second part of the second volume of a nine-volume study entitled Evaluation of Military Field-Water Quality. The first and third parts of this volume address organic chemical contaminants and inorganic chemicals and physical properties, respectively. Titles of the other volumes are as follows: Vol. 1, Executive Summary; Vol. 3, Opportunity Poisons; Vol. 4, Health Criteria and Recommendations for Standards; Vol. 5, Infectious Organisms of Military Concern Associated with Consumption: Assessment of Health Risks, and Recommendations for Establishing Related Standards; Vol. 6, Infectious Organisms of Military Concern Associated with Nonconsumptive Exposure: Assessment of Health Risks, and Recommendations for Establishing Related Standards; Vol. 7, Performance Evaluation of the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU): Reverse Osmosis (RO) Components; Vol. 8, Performance of Mobile Water Purification Unit (MWPU) and Pretreatment Components of the 600-GPH Reverse Osmosis Water Purification Unit (ROWPU) and Consideration of Reverse Osmosis (RO) Bypass, Potable-Water Disinfection, and Water-Quality Analysis Techniques; and Vol. 9, Data for Assessing Health Risks in Potential Theaters of Operation for U.S. Military Forces.

As indicated by the titles listed above, the nine volumes of this study contain a comprehensive assessment of the chemical, radiological, and biological constituents of field-water supplies that could pose health risks to military personnel as well as a detailed evaluation of the field-water-treatment capability of the U.S. Armed Forces. The scientific expertise for performing the analyses in this study came from the University of California Lawrence Livermore National Laboratory (LLNL) in Livermore, CA; the University of California campuses located in Berkeley (UCB) and Davis (UCD), CA; the University of Illinois campus in Champaign-Urbana, IL; and the consulting firms of IWG Corporation in San Diego, CA, and V.J. Ciccone & Associates (VJCA), Inc., in Woodbridge, VA. Additionally a Department of Defense (DoD) Multiservice Steering Group (MSG), consisting of both military and civilian representatives from the Armed Forces of the United States (Army, Navy, Air Force, and Marines), as well as representatives from the U.S. Department of Defense, and the U.S. Environmental Protection Agency provided guidance, and critical reviews to the researchers. The reports addressing chemical, radiological, and biological constituents of field-water supplies were also reviewed by scientists at Oak Ridge National Laboratory in Oak Ridge, TN, at the request of the U.S. Army. Furthermore, personnel at several research laboratories, military installations, and agencies of the U.S. Army and the other Armed Forces provided technical assistance and information to the researchers on topics related to field water and the U.S. military community.

ACKNOWLEDGMENTS

The principal investigators at the Lawrence Livermore National Laboratory (LLNL), Drs. Jeffrey Daniels, David Layton, and Lynn Anspaugh, extend their gratitude and appreciation to all of the participants in this study for their cooperation, assistance, contributions and patience, especially to Dr. Stephen A. Schaub, the project officer for this monumental research effort, and to his military and civilian colleagues and staff at the U.S. Army Biomedical Research and Development Laboratory (USABRDL). A special thank you is extended to the editors, secretaries, and administrative personnel of the Environmental Sciences Division at LLNL, particularly to Ms. Barbara Fox, Ms. Yvonne Ricker, Ms. Penny Webster-Scholten, Mr. E.G. Snyder, Ms. Gretchen Gallegos, Ms. Angelina Fountain, Ms. Sherry Kenmille, Mr. David Marcus, Ms. Martha Maser, and Ms. Sheilah Hendrickson, whose efforts, support, and assistance included the typing and editing of over 2500 pages of text.

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PREFACE

Water that may be used by military personnel in the field can contain many different organic and inorganic chemical constituents. These chemicals may exist in a dissolved or colloidal state or on suspended material, and they are present as a consequence of either natural geochemical and hydrological processes or the industrial, domestic, or agricultural activities of man.

The health risk to military personnel from a chemical constituent of field water is largely a function of the frequency with which it occurs at concentrations that are high enough to produce a toxic or organoleptic (e.g., detectable taste or odor) effect that leads directly or indirectly to the diminished ability of exposed military forces to perform assigned tasks. To minimize performance-related effects in military personnel using field-water supplies, the high-risk chemical constituents must be identified and analyzed. The potential health risks of the contaminants can then be managed by adopting field-water quality standards. The health effects that could occur when standards are exceeded can be addressed on a case-by-case basis.

The objective of this volume of Evaluation of Military Field-Water Quality is to indicate the chemical constituents of field water that are of possible military concern and to describe the screening methodology and supporting data that we used to identify them. Briefly, the screening methodology is separated into two phases. In both phases the general approach consists of comparing (1) the maximum likely concentration in field water of each possible chemical constituent with (2) a corresponding concentration we estimate to be the threshold above which toxic effects, including impaired performance, could occur. Our analyses are based on 70-kg military personnel consuming field water at a maximum rate of 15 L/d. Maximum likely concentrations in field water for each chemical are derived from our compilation of available U.S. and worldwide water-quality monitoring data. However, in the first phase of screening we make conservative assumptions to extrapolate the threshold concentration above which toxic effects could occur in military forces from either oral-mammalian LD50 (lethal dose to 50% of a population) data or Acceptable Daily Intake (ADI) values for humans. The result of this screening procedure is to exclude from further consideration those chemical constituents that are not expected to be of military concern. Although the conservative assumptions incorporated into the initial screening exercise minimize the omission of substances that may actually be of concern, some substances may be identified incorrectly as high risk. Therefore, to refine the results of the initial screening effort, we reexamine the available monitoring data and review the published human-toxicity data more carefully for each chemical indicated to be of possible military concern. Next, we use any more appropriate human-toxicity data (e.g., dose-response information from reported accidental poisonings, occupational exposures, or therapeutic administrations) we find and apply it in the second phase of screening. Then, as in the initial screening procedure, any ratio greater than unity between the maximum likely concentration for a chemical in field water and the concentration above which it could produce toxic or organoleptic effects in 70-kg military personnel consuming field water at a maximum rate of 15 L/d indicates that the chemical really could be of military concern. Because impaired performance can occur as a result of indirect health effects, especially from heat illnesses caused by dehydration resulting from reduced consumption of poor-tasting water, we also screen the initial list of chemicals by comparing maximum likely concentration data for each one with available data corresponding to the concentration of the substance that represents the taste- or odor-detection threshold in water.

To facilitate data acquisition, analysis, and review, as well as application of the screening methodology, we separated the potential chemical constituents of field water into three categories and divided Volume 2 into three corresponding parts. Part 1 covers organic solutes (except pesticides), Part 2 addresses pesticides, and Part 3 focuses on inorganic chemicals and physical properties.

ABSTRACT

The purpose of this part of Volume 2 is to assess the hazard that pesticides in water pose to the health and performance of troops stationed overseas. To assess the likely exposure, the open literature was searched for reports of pesticide concentrations in water, primarily outside of the United States. Based on 15-L/d water consumption, pesticides found in concentrations causing an excess of an Acceptable Daily Intake (as proposed by the World Health Organization) were further evaluated for their toxicity and exposure potential. The assessment included information collected on quantities of pesticides used around the world. Incidents of severe contamination of water by pesticides were also investigated to identify situations that might involve serious pesticide contamination.

As a result of the investigation, we found that pesticide contamination of large bodies of water (e.g., lakes, rivers, and oceans) is generally not at levels that threaten troop health or performance. Consequently, foreign water supplies need not be routinely treated specifically to remove pesticides. The greatest threat to troop health from pesticides in water appears to come from infrequent, transient occurrences of extreme contamination, particularly in small bodies of water with little potential for dilution.

Because severe contaminations are known to occur, and because they would seriously affect the health and performance ability of troops, it is recommended that the military develop field techniques to detect certain classes of pesticides and selected individual pesticides. Because pesticide-contaminated water may be the only available source of drinking water, it is also recommended that the treatability of pesticides in water be investigated. It must be recognized that, by accident or intent, any pesticide can be present in water at levels that would render water unacceptable for use. However, lindane is the pesticide that appears the most likely to be found at dangerous levels in water as a result of its normal use. The most widely used organophosphates (e.g., malathion and parathion) appear to present a less likely hazard, but these compounds should also be considered for the development of detection techniques and for treatability studies.

INTRODUCTION

Certain chemical constituents of field water can adversely affect the health of military personnel and can diminish the ability of the individual soldier to perform assigned tasks. The purpose of Volume 2 of Evaluation of Military Field-Water Quality is to identify these chemicals. Key considerations in identifying these substances are (1) their occurrence in foreign water supplies, (2) the concentrations measured, and most importantly (3) their toxicity. Volume 2 is divided into three parts: Part 1 covers organic solutes (except pesticides), Part 2 addresses pesticides, and Part 3 focuses on inorganic solutes and physical properties.

In this part of Volume 2, we assess the hazard that pesticides in water pose to the health and performance of troops stationed in foreign countries. As a category, pesticides are important because they are closely associated with agricultural irrigation and can be present in both ground water and surface water. In addition, large volumes of pesticides are used in all regions of the world, and many are known to be toxic to humans at relatively low doses.

The methodology that we use to identify pesticides that may pose problems in military field-water supplies includes a screening evaluation for potential toxicity in water of all pesticides for which water concentration data are available, and a closer examination of those pesticides that screening indicates could be found in water at concentrations at or near toxic levels. Not all of the information needed by the personnel responsible for the management of the risks that pesticides in water present to troop health is currently available. These information gaps are described at the end of this part, along with any pesticides considered to be used frequently enough and at high enough concentrations that establishing related field-water quality standards would be beneficial for troop health.

SCREENING METHODOLOGY

The purpose of pesticide screening is to identify any pesticides that might be in the water supplies used by military personnel and to indicate the ones among these that are most likely to cause performance-degrading or irreversible health effects, based on a drinking-water consumption rate of up to 15 L/d. Distinguishing the most threatening among these pesticides requires a qualitative assessment of the risks posed by each one. Performing such an assessment not only requires identifying the pesticides likely to be present in the water, but also estimating the concentrations of those pesticides and the health consequences of consuming water with the expected levels of pesticide contamination. The methodology we use to screen the pesticides and to identify the most threatening among them involves collecting the information mentioned above and evaluating it in order to support a judgment as to which pesticides require maximum-concentration standards.

A flowsheet illustrating the use of the information collected to evaluate the relative risks presented by pesticides in drinking water is presented in Fig. 1. The procedure used to identify the pesticides likely to be present in foreign water supplies is described below. Following it is a description of the process used to evaluate the list of pesticides and to identify those that are most likely to cause performance degradation and irreversible health effects in troops.

PROCEDURE USED TO IDENTIFY PESTICIDES IN WATER SUPPLIES

As illustrated in Figure 1, three different kinds of data were examined to identify the pesticides likely to be present in water supplies. The three kinds of data were monitoring data, production and use data, and literature reports of illnesses caused by pesticide-contaminated drinking water. Monitoring data showed which pesticides have been identified in various drinking-water supplies and their concentrations. Production and use data disclosed which pesticides have been manufactured and applied in the greatest amounts. The ones used in the greatest amounts are more likely to find their way into water supplies and to be present at toxic concentrations. The third kind of information used to identify pesticides in water supplies was literature reports of illnesses attributed to pesticide contamination of drinking water. The limitations of each source of data are discussed below. We used the three different sources of data to create the list of pesticides to be screened.

Monitoring Data

The purpose of using monitoring data on pesticide levels in water was to characterize the extent to which troops stationed overseas would be exposed to pesticides through water supplies. We wanted to know which pesticides had been found in the water, what concentrations had been measured, which pesticides are most commonly present in water, and which waters are most frequently and severely contaminated. The available monitoring data alone could not answer all of these questions definitively, but it could provide the best indications of the extent of exposure. Consequently, we put substantial effort into collecting this information.

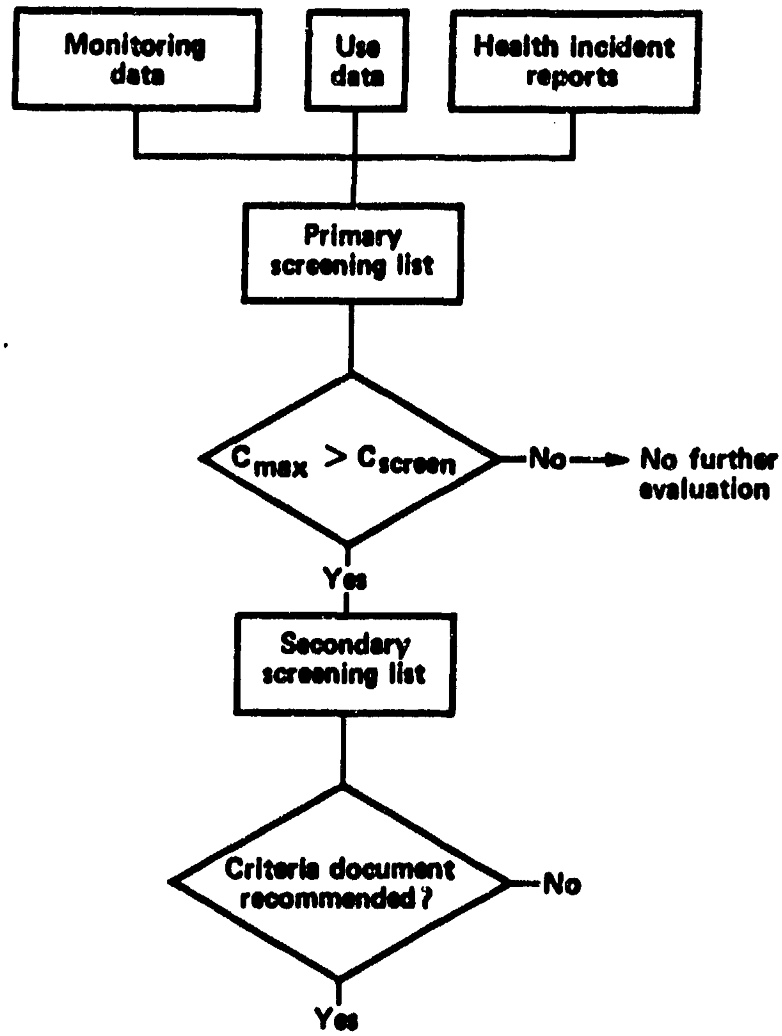

Figure 1. Screening methodology. (C_{max} = maximum concentration in field water, above which toxicity is predicted for field personnel consuming water at a rate of up to 15 L/d; C_{screen} = screening concentration for human toxicity.)

Most of the monitoring data we collected was obtained from an extensive search of the open world literature. Manual searches through the collections of various general and specialized libraries and bibliographies uncovered many valuable reports. However, the most productive sources of data proved to be computerized bibliographic data bases. Fifteen data bases (Table 1) were searched for articles and reports back to 1970. After we obtained relevant documents, cross-references to other authors were also investigated. The concentration data reported from many studies were entered into a computerized data base to facilitate evaluation.

During the course of our research we also discovered unpublished bodies of data on pesticide levels in water. For a variety of reasons, not all of these data could be made available to this study. Some of these data may be obtainable through diplomatic channels or made available to the public after the passage of time. We obtained other unpublished information through personal communication with a number of organizations (see Table 2).

Pesticide Production and Use Data

The purpose of collecting data on the production and use of pesticides in foreign countries was to identify the pesticides that are used abroad in large quantities. Pesticides produced or used in large volumes are assumed to have a greater probability of being present in water supplies at toxic concentrations. In addition, the production and use data complement the monitoring data. For example, some pesticides are very difficult to detect in water and may not be measured in the waters of some countries, even though they are used extensively. These pesticides were evaluated more closely for their potential to contaminate water supplies.

Information on the production and use of pesticides in foreign countries was primarily collected from literature sources. For some countries, we supplemented these sources with information obtained from conversations with individuals knowledgeable about pesticide use in those countries. Statistical literature on pesticide use is abundant. However, at present, there is no single guide to this subject on a worldwide basis. Accordingly, we relied on several different sources. These are listed and briefly described in Appendix A.

Health Incidents from Pesticide Contamination of Water

Another data source for identifying pesticides that might present health hazards as drinking-water contaminants was documented incidents in which pesticides in drinking

Table 1. Bibliographic data bases used to locate documents containing concentration data.

Chemical Abstracts
Aqualine
Aquatic Science Abstracts
Pollution Abstracts
Water Resources Abstracts
Toxline
Enviroline
NTIS
BIOSIS Previews
CAB Abstracts
Agricola
Oceanic Abstracts
Environmental Bibliography
Predicasts
Science Citation Index

Table 2. Organizations contacted to obtain information on the occurrence of pesticides.

USDA, Economic Research Service
Battelle Memorial Research Institute
SRI International
Predicasts
UN Environmental Program: International Register of Potentially Toxic Chemicals
Canada, Prairie Provinces Water Board. National Water Quality Data Bank (NAQUADAT)
Stauffer Chemical Company
UC Berkeley, Water Resources Archives
Egyptian Ministry of Agriculture

water actually had caused human health problems. This type of data was completely different from the two types previously described, which were limited to identification or prediction of the presence of pesticides in water. As such, we felt that these additional data assure that we had identified the most important potential pesticide contaminants. To collect these data, we searched the open literature for any case reports or epidemiology reports of human health effects attributed to pesticides in drinking water. Evaluation of these incidents would help identify potential pesticide problems. These incidents were also of value in assessing the relative importance of the different pesticides and of pesticides as a class in comparison with nonpesticide organic and inorganic substances covered in Parts 1 and 3 of Volume 2.

PROCESS USED TO IDENTIFY PESTICIDES OF MOST CONCERN AS WATER CONTAMINANTS

We assembled a rather long list of pesticides known or strongly suspected to be present in water, from the different sources of data we reviewed. The next step was to determine which pesticides would be likely to be found at concentrations too low to cause human health effects, and to remove such pesticides from further consideration. This separation process is referred to as the primary screening. The remaining pesticides were evaluated to assess their likelihood of causing performance degradation in troops and to determine whether the establishment of a maximum allowable concentration would help protect troop health. This further evaluation is referred to as the secondary screening. The methods and rationale for the primary and secondary screenings are described below.

Primary Screening

The primary screening is a comparison of the maximum pesticide concentrations reported in water to concentrations judged to be acceptable for at least one year of exposure. Pesticides found in water at concentrations exceeding acceptable concentrations even once were flagged for closer scrutiny. Very conservative estimates of acceptable concentrations for the assumed maximum exposure period of one year were used to assure that pesticides omitted from further scrutiny were unlikely to cause human health problems.

The acceptable concentration was based on Acceptable Daily Intake (ADI), as recommended by the Food and Agricultural Organization of the World Health Organization (FAO/WHO). ADI's are total daily doses judged by FAO expert panels to be acceptable for lifetime exposures. An ADI is given in units of mg/kg body weight, and we converted this into a drinking-water concentration, using the assumption of a 70-kg adult and a 15-L/d water consumption rate. The screening concentrations were calculated from the ADI by

$$C_S = ADI \cdot \frac{W}{I}, \tag{1}$$

where

C_s = screening concentration for human toxicity, mg/L;
ADI = acceptable daily intake, mg/(kg•d);
W = reference body weight of a soldier, kg; and
I = maximum daily intake of water, L/d.

Typically, pesticide residues on food account for 90% or more of the exposure, and residues in water only contribute a small fraction of the total daily exposure. Our calculations used to derive the concentrations for screening comparisons do not account for the intake of pesticides from food. These values are nonetheless conservative estimates of pesticide concentrations likely to produce adverse effects in humans because the ADI is judged to be safe for a lifetime exposure, and our concern is a one-year exposure. In addition, the assumed 15-L/d water consumption rate is unlikely to be sustained for an entire year.

The FAO has not established ADI's for all pesticides; thus, in order to identify which of these pesticides need further evaluation, based on screening comparisons, it was necessary for us to use an additional method of calculating a screening concentration, not based on an ADI. For these calculations, we employed the methodology described by Layton et al.[1] in Part 1 of Volume 2. This methodology is based on converting the oral LD50 (lethal dose, expressed in mg of chemical per kg of body weight, to 50% of a population of laboratory animals) for a particular chemical to a dose with a high probability of being below a toxic threshold for humans--a lower-bound limit equivalent to a no-observed-effect level (NOEL). Under this scheme, the LD50 (mg/kg) for a particular chemical is multiplied by a conversion factor derived from a statistical analysis of the ratios between LD50 values and subchronic (~90-d) NOEL's [mg/(kg•d)] determined for 33 organic chemicals. The conversion factor selected for the purposes of the screening effort was 0.004 d^{-1}, the ratio corresponding to the tenth cumulative percentile of the log normal distribution of all of the ratios (geometric mean of the ratios was 0.03 d^{-1}, with a geometric standard deviation of 4.8). The calculated NOEL is then adjusted further by a safety factor of 100 because this safety factor is used in the setting of standards and to account for inter- and intraspecies variations. Therefore, the screening concentration for human toxicity for a particular pesticide (C_s), in units of mg/L (based on a reference body weight of 70 kg and a maximum drinking-water consumption rate of up to 15 L/d for military personnel), can be computed from its LD50 (mg/kg) according to the expression:

$$C_s = \frac{LD50 \bullet 0.004}{100} \bullet \frac{70}{15} \quad . \tag{2}$$

To simplify this computation for determining screening concentrations, the LD50 is multiplied by 10^{-4}. For purposes of completeness, we also applied this calculation to those pesticides where ADI data were available.

In addition to the two ways for determining screening concentrations, we compared the available taste- and odor-threshold concentrations for several pesticides (see Appendix B) with their ambient water concentrations. The pesticide concentrations that were found to exceed their taste or odor thresholds were noted, but they were not given closer evaluation for potential health effects unless they also exceeded one of the calculated screening concentrations for human toxicity.

Secondary Screening

The primary screening is a conservative approach because it is designed to identify even those pesticides that would cause adverse effects following exposures of many years, and the assumed exposure period for consuming field water is only one year. For example, some pesticides are suspected of being carcinogenic, and their ADI's are established at a very low level, representing the FAO's judgments of an acceptably low cancer risk from a lifetime exposure. The secondary screening is used to examine the pesticides that the primary screening indicated to be of possible concern to troop health, and to separate the pesticides that may actually cause performance-degrading effects in troops from the ones that are unlikely to cause such effects during a one-year exposure period. Pesticides unlikely to cause performance-degrading effects may still present some risk of chronic effects (e.g., cancer). When evidence of this was available, it was mentioned in the secondary screening evaluation.

The secondary screening evaluations assess the exposure to the pesticides by identifying the common uses and extent of use of the pesticide. The typical and maximum concentrations likely to be encountered are also discussed on the basis of monitoring data and theoretical considerations (e.g., solubility in water). The likely human health effects caused by the characterized exposures are then described.

RESULTS

The results of this study are presented in two parts. The first describes the results of the efforts to identify the pesticides likely to be present in water supplies used by troops stationed overseas and presents a list of the identified pesticides. The second part describes the results of efforts to evaluate the pesticide list and characterizes the hazards that pesticides in water appear to present to troop health.

PESTICIDES MOST LIKELY TO BE PRESENT IN FOREIGN WATER SUPPLIES

The most useful information on the kinds of pesticides present in water, the level of contamination, and the types of water bodies most likely to be dangerously contaminated came from the monitoring data that we collected. These results are described below. Supplementing and reinforcing the monitoring data are the findings from pesticide production and use, as well as reports of health incidents attributed to pesticides in drinking water.

Monitoring Data

The data base we created from our collection of monitoring data has approximately 500 sampling sites. Approximately 50% of the samples are within detection limits. Chlorinated-hydrocarbon insecticides appear to be the most frequently occurring class of pesticides. The compounds found most often were DDT, along with its isomer and metabolites (o,p'-DDT, DDE, and DDD); BHC and its isomers (alpha-, beta-, and gamma-, i.e., lindane); dieldrin and aldrin; heptachlor and heptachlor epoxide. A complete record of the monitoring data has been assembled in Appendix C.

Limitations of Monitoring Data. The primary purpose of collecting the monitoring data was to estimate the level of pesticides that troops might encounter in foreign water supplies. The main shortcoming of the data is that so little of it is available. This appears to be largely attributable to the lack of water-monitoring programs in most parts of the world. In some countries monitoring data exist, but never reach the open literature, and the government ministries or agricultural research institutes in possession of such data are reluctant to release them. A much smaller amount of data has not been included in the data base because we were unable to translate all of the foreign-language reports we received, or because we were unable to locate all reports identified as containing pertinent data.

Another important limitation of the monitoring data is that the most severely contaminated bodies of water are the least represented in the data base. On the basis of measurements reported in the literature and conversations with individuals who are familiar with pesticide practices in developing countries, the most severely contaminated waters appear to be small sources, such as canals and reservoirs, adjacent to irrigated lands. These sources are poorly represented in our data base. There are also relatively little monitoring data available on the levels of pesticide contamination in ground water. The information that is available, however, suggests that pesticide levels in ground water, like those in large rivers and lakes, tend to provide little reason for concern about human health. This is particularly true for exposure periods that are limited to one year or less. Most information is available on pesticide levels in large rivers and lakes. Dilution in these large water bodies has most likely played a significant role in bringing about the generally low levels of pesticides measured in them.

We made no attempt to critique the sampling or detection methods used for the reported concentrations. When one or more reported values were substantially higher than the bulk of the reported measurements for a given pesticide, we did look at the high values more carefully to be sure that there were no obvious errors, such as in the incorrect reporting of units (e.g., μg vs mg). We also looked at the original article to see what events led to such a high level, and we evaluated the feasibility of the highest concentrations in light of the pesticide's water solubility. In some cases (e.g., DDT), it is possible to have concentrations in natural waters that exceed the reported solubility of the pesticide, which is usually measured in distilled water.

Pesticide Production and Use Data

Based on world pesticide sales in 1982 (see Table 3), the U.S. is the largest single pesticide market in the world (33%). Western Europe (24%) is in second place, followed by Japan (11.5%) and Eastern Europe (9%). The developing countries account for the remaining 22.5% of world agrochemical sales. Brazil is the largest of the developing-country markets, accounting for approximately 7% of world sales, with India and Mexico each accounting for almost 2%. Although about 67% of the world market is in the agriculturally developed countries, the developing countries, nonetheless, are quite active in the manufacture of the active ingredients in pesticides.

As shown in Table 3, 50% of world herbicide sales are concentrated in the U.S. The insecticide and fungicide markets, however, are mostly in other parts of the world. Western Europe for instance, comprises 40% of the world fungicide sales. Likewise, the developing countries account for 40% of the world insecticide market.

Table 3. Worldwide pesticide sales by geographical area - 1982.[2]

Area	Pesticides				
	Herbicides	Insecticides	Fungicides	Other[a]	Total
	% of total sales				
USA	50	26	11	41	33
Western Europe	20.5	14.5	40	39	24
Japan	9.5	12.5	16	2.5	11.5
Eastern Europe	8.5	7	12.5	7	9
Rest of world	11.5	40	20.5	10.5	22.5

[a] Nematocides, fumigants, and plant growth regulators.

These global differences in the pesticide market reflect the diversification of agriculture throughout the world. Seven crop sectors account for over 75% of the total worldwide market in agrochemicals (see Table 4). Maize requires the largest use of herbicides. It is also a major U.S. crop that greatly contributes to the high use of herbicides in the U.S. Insecticides, on the other hand, are used mostly for cotton, fruit, and vegetables. These crops are widely grown in the developing countries, the largest insecticide market in the world. Similarly, Western Europe, with the bulk of world fungicide sales, cultivates 70% of the vineyards in the world.

Aside from these broad pesticide usage patterns, little information exists concerning actual consumption and production within individual countries. Predicting which specific pesticides are most likely to be used in a given country is complicated by several factors, among which are the diversification of crop type from locale to locale, the great variation in kinds of pesticides used on a given crop, and the cost of the pesticides. In fact, cost generally dictates the selection of pesticides, especially in the poor, developing nations. Changing agricultural practices, regulatory restrictions, and resistance of pests to insecticides increase the variability of worldwide pesticide use. Thus, if troops were entering an agricultural area where pesticide contamination of the water would be likely, it would not be possible to predict which pesticides were being used without very recent, local information.

Assorted sales and use data on insecticides in Egypt, India, Brazil, China, and the U.S. are presented in Tables 5 through 9, respectively. It is not surprising to find that the insecticides most frequently appearing in the monitoring data (DDT, BHC, and lindane)

Table 4. Worldwide[a] pesticide sales for selected crops.[2]

Target crop	Herbicides	Insecticides	Fungicides
	Pesticides		
	Sales (millions of 1982 dollars)		
Fruit and vegetables (includes vines)	425	1160	1300
Maize	1140	440	40
Rice	490	645	380
Cotton	325	1020	40
Soybeans	980	130	50
Wheat	650	100	345
Sugar beets	315	105	45

[a] Accounts for over 75% of the total worldwide market in agrochemicals.

are large-production chemicals as well. Although these particular chlorinated hydrocarbons are no longer widely produced in the U.S., they are still produced and used throughout the rest of the world. However, the demand for them is expected to remain static until the mid-1980's, and then decline thereafter (see Table 10). Conversely, carbamates and organophosphorus compounds are expected to increase substantially on a worldwide basis.

Herbicide and fungicide demand is also expected to increase throughout the world. Both North America and Western Europe are expected to double their use of these chemicals by the 1990's (based on 1975 figures). In other regions of the world, the demand for herbicides in the 1990's will grow by as much as eight times the amount used in 1975.[9]

Health Incidents from Pesticide Contamination of Water

Our literature searches uncovered a compilation of reported incidents of acute pesticide poisoning due to occupational exposures and accidentally contaminated grains and other foods.[10] However, there are relatively few documented cases of acute health effects due to pesticide-contaminated drinking water. Virtually all of the reports are from the United States. Those reported incidents related to pesticide-contaminated water were examined more closely and are summarized in Table 11.

Table 5. Amounts of major insecticides imported and used in Egypt (1950 to 1980).[3]

Compound	Imported quantity (metric tons)	Years of consumption
Toxaphene	54,000	1955 to 1961
Endrin	10,500	1961 to 1981
DDT	13,500	1952 to 1971
Lindane	11,300	1952 to 1978
Carbaryl	21,000	1961 to 1978
Trichlorphon[a]	6,500	1961 to 1970
Monocrotophos	8,300	1967 to 1978
Leptophos	5,500	1968 to 1975
Chlorpyrifos	9,500	1969 to 1981
Phosfolan	4,500	1968 to 1981
Mephosfolan	6,000	1968 to 1981
Methamidophos/Azinphos - methyl	4,500	1970 to 1979
Triazophos	3,500	1977 to 1981
Profenofos	4,000	1977 to 1981
Methomyl	3,500	1976 to 1981
Fenvalerate	4,500	1976 to 1981
Cypermethrin	2,300	1976 to 1981
Decamethrin	1,400	1976 to 1981

[a] Nonproprietary name used in Great Britain for trichlorfon.

Unfortunately, descriptions of the events leading to the water contamination were not available for all of the incidents listed in Table 11. However, it can be seen from the descriptions that are available that at least some of the ways in which the water became contaminated (e.g., back-siphoning or deliberate contamination) do not appear to be related to the specific pesticide. The same incident just as easily could have taken place with a different pesticide.

The literature confirmed that pesticides occasionally find their way into drinking water at toxic levels. The available information did not suggest that any single pesticide or class of pesticides causes repeated, acute outbreaks from the contamination of drinking-water supplies. It should also be noted that nausea, vomiting, abdominal pain, and diarrhea are commonly reported as the health effects attributed to

Table 6. Production of technical-grade pesticides in India (1978 to 1981).[4]

Compound	Quantity (metric tons)		
	1978 to 79	1979 to 80	1980 to 81
BHC	35,254	31,806	28,760
DDT	4,476	4,531	4,004
Malathion	2,845	2,136	1,264
Parathion	2,242	2,552	1,213
Metasystox	208	139	150
Fenitrothion	401	350	116
Dimethoate	721	804	817
Phosphamidon	563	585	451
DDVP (Dichlorvos)	278	218	103
Quinalphos	379	546	385
Phenthoate	11	--	0.6
Carbaryl	767	1,501	1,155
Endosulfan	36	133	496
Monocrotophos	46	171	338
Fenthion	--	--	54
Copper oxychloride	1,199	1,199	1,147
Thiocarbamates	--	1,733	1,159
Nickel chloride	48	12	39
Organomercurials	130	135	179
Carbendazim (bavistin)	25	27	28
Basalin	--	2	13.5
2,4-D	316	192	338
Nitrofen propanil	25	109	1.5
Paraquat	48	402	73
Ratafin	13	11	3
Cycocel	--	--	4.6
Zinc phosphide	170	158	197
Aluminum phosphide	591	249	710
Methyl bromide	34	19	33
Ethyl dibromide	40	20	25
Antibiotics	--	15	4.7

Table 7. Amount of imported and nationally produced insecticides during 1979 to 1981 for Brazil.[5]

Insecticides (common name)	Imported (tons)[a] 1979	Imported (tons)[a] 1980	Imported (tons)[a] 1981	Nationally produced (tons)[a] 1979	Nationally produced (tons)[a] 1980	Nationally produced (tons)[a] 1981
Aldicarb	2,046	1,055	1,006	--	--	--
Aldrin	962	1,026	725	--	--	--
B. thuringiensis	177	279	17	--	--	--
BHC	--	--	--	3,230	4,099	2,070
Carbaryl	1,955	1,438	276	--	--	--
Carbofuran	440	396	433	--	--	--
Carbophenothion	205	140	189	--	--	--
Camphechlor (Toxaphene)	--	--	--	3,893	--	--
Chlorpyrifos	411	513	421	--	--	--
DDT	--	--	--	4,444	2,752	1,818
Diazinon	144	122	134	--	--	--
Dichlorvos	100	70	190	--	--	--
Dicrotophos	--	--	--	450	462	190
Dimethoate	1,025	210	40	20	373	225
Disulfoton	478	220	314	--	--	--
Endosulfan	1,050	1,200	307	--	--	--
Endrin	1,474	459	215	--	--	--
Parathion	255	--	--	347	224	96
Fenthion	140	95	20	--	--	119
Heptachlor	339	259	379	--	--	--
Malathion	--	--	--	1,170	364	787
Demeton, methyl	145	272	--	--	--	158
Parathion, methyl	3,484	2,871	1,507	3,484	2,871	1,507
Mineral oil	3,018	2,500	--	--	529	1,514
Monocrotophos	--	--	--	2,200	2,396	938
Omethoate	85	143	140	--	--	--
Phorate	145	76	198	--	--	--
Phosphamidon	240	110	80	--	--	--
Trichlorfon	668	464	183	653	1,126	891
Wettable sulfur	2,223	2,682	239	--	225	2,325
Other	36	83	81	--	--	--
Total	18,795	16,165	5,945	19,891	15,421	13,233

[a] To convert to metric tons, multiple these values by 0.907.

Table 8. Insecticide production and use in China for 1982.[6]

Insecticide	Quantity (tons)[a]
BHC	200,000
Lindane	2,000
DDT	10,000 to 20,000
Trichlorphon	50,000
Malathion	50,000
Methyl/ethyl parathion	25,000
Dimethoate	small
Systox	300
Carbaryl	300
Fenitrothion	small

[a] To convert to metric tons, multiply these values by 0.907.

Table 9. U.S. insecticide use on corn, rice, cotton, soybeans, and wheat.[7,8]

Compound	Year		
	1966	1976	1982
	Millions of pounds[a]		
Toxaphene	28.6	29.2	5.6
DDT	19.9	--	--
Aldrin	14.2	--	--
Methyl parathion	7.3	22.1	10.4
Parathion	4.4	--	--
Carbofuran	--	10.3	5.3
EPN	--	6.2	--
Carbaryl	--	5.8	--
Phorate	--	5.8	--
Terbufos	--	--	8.7
Fonophos	--	--	5.1

[a] To convert to metric tons, multiply these values by 4.54×10^{-4}.

Table 10. Changes in demand for types of insecticides by main user regions (1975 to 1990).[9]

	1975			1990 (est.)		
	North America	Western Europe	Other regions	North America	Western Europe	Other regions
	Millions of dollars					
Organophosphates	290	220	590	750	400	1300
Carbamates	120	90	260	320	170	560
Chlorinated hydrocarbons	68	50	202	30	30	140
Nonchemical insecticides	15	5	20	100	50	50
Arsenic-based compounds	7	10	3	--	--	--
Total	500	375	1075	1200	650	2050

pesticide-contaminated water (see Table 11). Nevertheless, nonspecific effects such as these can be expected to be underreported, particularly in areas where microbial contamination of local drinking-water supplies is common. In addition, there are many reports of acute outbreaks of such health effects where the drinking water has been the suspected source of an unidentified causative agent.[20] Some of these outbreaks could have been caused by pesticides. Thus, while it does not appear that pesticide contamination of drinking water is a common occurrence, we should be cautious in concluding that it is as infrequent as the few well-documented reports suggest.

PESTICIDES OF MOST CONCERN AS CONTAMINANTS IN FOREIGN WATER SUPPLIES

The results of the two-stage evaluation to identify and characterize the most serious pesticide hazards are described below. The primary screening identified ten pesticides that warranted further scrutiny. The evaluations of the ten individual pesticides constitute the secondary screening and follow the discussion of the primary screening step.

Primary Screening

Table 12 presents data and lists the 50 pesticides for which we found monitoring data in the open literature. The underlined pesticides are those that met the criteria for

Table 11. Health incidents from pesticides in water.

Pesticide	Source of water contamination	Health effects	Concentration	Ref.
Arsenic mix	Groundwater contamination from waste disposal	Nausea, burning of mouth, paresthesia, weakness of extremities	10 to 21,000 μg/L	11
Sodium arsenite	Leachate from lawn	Vomiting, stomach pains	125 mg/L	12
Dieldrin	Leachate from farms	Cancer (lymphoma)	0.5 to 65 ng/L	13
Chlordane	Back-siphonage	Abdominal pain, eye irritation	1,200 mg/L	14,15
Chlordane	Deliberate poisoning	Abdominal pain, eye irritation	6,600 μg/L	16
Organo-phosphates	Unknown	Unknown	Unknown	17
Unknown herbicide	Treatment of lawn	Headache, vomiting, dizziness	Unknown	18
Methyl parathion	Uncertain	Death in 2 of 7 children, lethargy, increased salivation and respiratory secretions, pinpoint pupils.[a]	138 to 275 μg/L[b]	19

[a] Originally diagnosed as viral gastroenteritis.

[b] Concentrations measured in water containers in house of affected children.

further evaluation; that is, the maximum reported concentration exceeded either the ADI-based screening concentration or the LD50-based screening concentration. Presumably, the pesticides that are not underlined are unlikely to be found at levels that threaten health, even for long-term exposure. Similarly, the pesticides that are not underlined are considered unlikely to be found at levels that would cause performance degradation in troops.

Table 12. Primary screening list.[a]

Pesticide	Maximum reported concentration (μg/L)	ADI[21] [mg/(kg•d)]	ADI-based screening concentration (μg/L)	Rat oral LD50[22] (mg/kg)	LD50-based screening concentration (μg/L)
Aldrin	1.80	0.0001	0.5	39	3.9
Bayluscide	0.00	—	—	—	—
Benthiocarb	10.00	—	—	1903	190.3
BHC	2360.00	—	—	—	—
alpha-	830.00	—	—	177	17.7
beta-	830.00	—	—	6000	600.0
gamma-(lindane)	1920.00	0.01	46.7	76	7.6
Captafol	0.00	0.1	466.7	2500	250.0
Captan	0.00	0.1	466.7	9000	900.0
Carbaryl	0.40	0.01	46.7	250	25.0
Chlordane	0.00	0.001	4.7	283	28.3
cis-	0.10	—	—	—	—
beta trans-	0.50	—	—	—	—
Chlorobenzilate	0.00	0.02	93.3	700	70.0
CNP	16.67	—	—	10,800	1080.0
2,4-D	0.22	0.3	1400	370	37.0
DDMU	0.02	—	—	—	—
p,p'-DDT	1500.00	0.005	23.3	87	8.7
o,p'-DDT	0.95	—	—	—	—
p,p'-DDD	1060.00	—	—	113	11.3
o,p'-DDD	0.06	—	—	—	—
p,p'-DDE	2100.00	—	—	880	88.0
o,p'-DDE	0.03	—	—	—	—
Diazinon	60.00	0.002	9.3	66	6.6
Dichlorvos	0.00	0.004	18.7	32	3.2
Dieldrin	1.03	0.0001	0.5	40	4.0
Dimethoate	0.08	0.02	93.3	152	15.2
Endosulfan	0.55	0.0075	35	18	1.8
alpha-	5.80	—	—	—	—
beta-	2.40	—	—	—	—

Table 12. (Continued)

Pesticide	Maximum reported concentration (μg/L)	ADI[21] [mg/(kg•d)]	ADI-based screening concentration (μg/L)	Rat oral LD50[22] (mg/kg)	LD50-based screening concentration (μg/L)
Endrin	1.50	0.0002	0.9	3	0.3
EPN	0.00	—	—	8	0.8
Fluometuron	540.00	—	—	8900	890.0
Fluridone	50.00	—	—	—	—
Heptachlor	0.70	0.0005	2.3	40	4.0
epoxide	0.04	0.0005	2.3	47	4.7
Hexachlorobenzene	0.14	—	—	10,000	1000.0
Leptophos	13.47	0.001	4.67	30	3.0
Malathion	1600.00	0.02	93.3	370	37.0
Methoxychlor	0.00	—	—	5000[b]	500.0
Mevinphos	0.00	0.0015	7	3	0.3
Monocrotophos	0.00	0.0006	2.8	8	0.8
Oxadiazon	1.95	—	—	3500	350.0
Parathion	0.07	0.005	23.3	2	0.2
Parathion, methyl	0.17	0.001	4.7	6	0.6
PCP-Na	0.00	—	—	—	—
Phosphamidon	110.00	0.001	4.7	15	1.5
Toxaphene	20.90	—	—	40	4.0
Trifluralin	0.80	—	—	5000[b]	500.0
Trithion	0.00	—	—	7	0.7

[a] Underlined pesticides are those identified for further screening, based on monitoring data being in excess of either the ADI-based or LD50-based screening concentration.

[b] Oral LD50 for mouse.

Taste and odor thresholds (see Appendix B) were compared to maximum reported concentrations in water (see Appendix C and Table 12). Threshold concentrations were not available for all pesticides reported in our monitoring data base. However, the pesticides which were present at levels exceeding their taste or odor threshold included DDT, lindane, malathion, and methyl parathion.

Secondary Screening

The following section states the results of the secondary screening of the ten pesticides identified in the primary screening. The section describes the events leading to the presence of each subject pesticide in water, characterizes each exposure (e.g., level and duration), and discusses the probable consequences of the exposure. The pesticides evaluated include aldrin, DDT (including DDE and DDD), diazinon, dieldrin, endrin, leptophos, lindane (including other BHC isomers), malathion, phosphamidon, and toxaphene.

Aldrin. Aldrin is a broad-spectrum, nonsystemic soil insecticide.[23] It readily oxidizes to dieldrin, its main metabolite.[24]

Although aldrin is no longer produced in the U. S., it is still used here in deep ground insertions for termite control, nursery dipping of roots and tops of nonfood plants, and fabric mothproofing when there is no effluent discharge.[25,26] Previously, however, the major U.S. agricultural use had been for control of soil insects that damage corn and citrus crops.[25] Its use on food crops has since been cancelled on the basis that it may cause severe environmental damage and is a potential carcinogen.[25,26] Outside the U.S., aldrin is still widely used on corn, root crops, sugar cane, and fruit crops.[23] In addition, it is also used for seed treatment.[23]

In the open literature, the reported concentrations of aldrin in water ranged from 0 to 1.8 µg/L (see Appendix C). The typical average value for detected samples was less than 0.5 µg/L. The highest value (1.8 µg/L) was detected in Malaysian paddy water, as were the majority of high concentrations[27]. Unfortunately, the author did not give an explanation for these values. Given aldrin's water solubility of up to 180 µg/L (at 25°C), it is reasonable to believe that the monitored values do exist.[28-29]

Aldrin is a persistent chlorinated-hydrocarbon insecticide.[23] Since it is used primarily as a soil insecticide, it enters water systems by way of soil erosion and sediment transport.[20] Aldrin is rapidly converted to dieldrin and remains persistent in the environment in that form. Studies have shown that the conversion of aldrin to dieldrin in river water was 80% complete after 8 wk.[30] In soils, residues of aldrin may persist for years. In one study, 26% aldrin remained after 1 y, 5% after 3 y.[30] Other studies show a 75 to 100% disappearance from soils in 1 to 6 y.[31] Furthermore, aldrin has little tendency to volatilize or leach and thus tends not to move away from the treated area.[32] In soils, the major route of breakdown of aldrin is by microbial degradation.[30] In aquatic environments, biotransformation, volatilization, bioaccumulation, and indirect photolysis appear to be involved in the degradation of aldrin.[29]

For a 70-kg individual who drinks 15 L of water per day, we estimated the dose-response (concentration in water = dose [mg/(kg • d)] x 70 kg/15 L of water per day) of aldrin in water. As can be seen in Table 13, the maximum concentration reported in the open literature (1.8 µg/L) and the solubility of aldrin in water (up to 180 µg/L at 25°C) are well below the no-effect level (1000 µg/L). Hence, although aldrin persists in the environment, reported concentrations do not approach levels that might be harmful to military personnel. The International Agency for Research on Cancer (IARC) evaluated the carcinogenicity of aldrin and found two studies on rats to be negative and two to be inadequate; a fifth study on mice was also judged to be inadequate.[35] A study on exposed workers was judged insufficient to allow conclusion of excess cancer risk.[36]

<u>DDT</u>. Technical DDT is a mixture including about 70 to 73% of the p,p'-isomer, 12 to 21% of the o,p'-isomer, and a small amount (about 0.01 to 6%) of the o,o'-isomer.[29] DDT can degrade in the environment to DDD and DDE. Most monitoring data are available for the p,p'-isomer, but there is also a relatively large amount of data on the o,p'-isomer and on DDD and DDE.

Although DDT was banned from large-scale use in the United States in 1973, large amounts of it are still used for insect control in many parts of the world. It is used on many crops and is applied directly to water for mosquito eradication in the malaria control programs of many countries.

The DDT concentration reported in various waters from around the world are, with very few exceptions, less than 1 µg/L. One study reported finding DDT at 1500 µg/L in a rural pond in India.[37] This is more than 10 times greater than the next highest average reported concentrations, which are from the Seyhan Delta of Turkey (see Appendix C, Table C-18). The highest levels of DDT are usually reported following storms[37,38] and are probably related to the sediment burden of the runoff.[39]

The generally low levels reported for DDT concentrations are consistent with the extremely low solubility of DDT in water. Reports of DDT solubility in water vary from >1.2 to 85 µg/L.[29] Levels in natural waters containing organic material can greatly exceed the levels soluble in distilled water[40], or DDT may be present in water as an

Table 13. Dose-response data for aldrin.

Equivalent expressions for dose[a] Food contaminant [mg/(kg•day)]	Water concentation[b] (μg/L)	Response[c]	Ref.
0.0001[d]	0.47	Acceptable Daily Intake (ADI)	21, 33
0.20	930	No effect (dog)	34
0.2	1000	No-clinical-effects level (2 y)	34
8.2	38,000	Death (child)	34
14.0	65,000	Central nervous system problems	30
25.6	120,000	Acute convulsive poisoning	34
56.0	260,000	Death	30
65.0	300,000	Estimated median lethal dose	26

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 1.8 μg/L (see Appendix C); solubility of aldrin in water: up to 180 μg/L at 25°C.

[c] Human dose-response unless otherwise indicated.

[d] No separate ADI for man has been set for aldrin, although a total dieldrin and aldrin ADI for man of 0.0001 mg/kg body weight has been recommended.

emulsion rather than in a truly dissolved form. The report of 1500 μg/L did not describe the sampling or analytic methods used, nor did it offer any explanation of how such a high level was attained.

Table 14 shows water concentrations that would deliver acutely toxic doses of DDT if 15 L of water was consumed daily by a 70-kg adult. The acutely toxic concentrations are about 10,000 times higher than typical DDT concentrations reported in the literature. The concentration that corresponds to the Acceptable Daily Intake (ADI) for DDT is 23 μg/L and is higher than most of the concentrations reported in the literature, which are predominantly below 1 μg/L.

However, as the DDT levels in the pond water from India indicate, very high concentrations may be present in some situations. As can be seen in Table 14, the 1500-μg/L concentration reported from the pond is well below the concentration associated with an acutely toxic dose (28,000 μg/L). It is even somewhat lower than the concentration associated with a dose that was tolerated for 600 d (2300 μg/L) without

Table 14. Dose-response data for DDT.

Equivalent expressions for dose[a]			
Food contaminant [mg/(kg•day)]	Water concentration[b] (μg/L)	Response[c]	Ref.
0.005	23	Acceptable Daily Intake (ADI)	21, 41
0.5	2,300	No clinical effects after >600-d exposure	42
6	28,000	Smallest dose with clinical effect; nausea, headache, perspiration	43
10	47,000	No signs of poisoning below this dose in healthy people	43
16	75,000	Convulsions appear	43

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 1500 μg/L (see Appendix C); solubility of DDT in water: >1.2 to 85 μg/L.[29]

[c] Human dose-response unless otherwise indicated.

producing clinical effects, although increased body storage of DDT was detected.[42] DDT has been tested for carcinogenicity in several animal species, and some of these tests produced positive results (e.g., in mice).[36] Human data were not considered by IARC to be sufficient to support a conclusion.[36]

Because of the low water solubility of DDT and the low human toxicity of DDT, it appears that the probability is low that DDT in drinking water will cause acute or chronic health problems in troops. However, one caveat to this conclusion is that unpredictably high levels of DDT may arise following its direct application to water for such purposes as mosquito control. In such uses, DDT may be present as an emulsion, may be floating on top, or may be adsorbed by organic matter in the water.

Diazinon. Diazinon is a nonsystemic, broad-spectrum insecticide/acaricide.[23] Its main metabolites are diazoxon, hydroxydiazinon, pyrimidinol, and hydroxypyrimidinol.[44]

Several uses for diazinon are described in two reports addressing agricultural chemicals and pesticides.[23,24] For example, in the U.S., diazinon is used on various fruits, vegetables, root crops, and vineyards for the control of sucking and leaf-eating insects. It is also used for seed treatment and as a soil preplanting insecticide. Diazinon is often used in veterinary practice for flea, lice, tick, and fly control. It is also used to treat cracks and crevices for insect control. Outside the U.S., diazinon is used for the control of stemborers and leafhoppers in rice. It is also used for ectoparasites (e.g., mange, blowfly) on livestock.

Based on studies reported in the open literature, it appears that diazinon is seldom detected in water samples (see Appendix C, Table C-19). The highest reported occurrence of diazinon was in rice paddy water in Iran.[45] However, this study was conducted for experimental purposes to assess the breakdown rate of diazinon in rice fields. A maximum concentration of 60 µg/L was detected immediately after application. However, by the tenth day, no diazinon remained in the water. The maximum concentration (60 µg/L) is well below diazinon's water solubility of 40,000 µg/L (at 20°C).[24,31]

Diazinon is considered to be a moderately persistent pesticide.[32] It usually enters water systems by means of leaching or surface runoff. However, aquatic systems remote from target areas are unlikely to be adversely affected, unless heavy rainfalls occur shortly after application.[32] The half-life of diazinon varies with pH values. For instance, at pH 3.14 the half-life in water was 0.5 d, while at pH's of 7.4 and 10.9, the half-life was 185 and 6 d, respectively. Therefore, it appears that at high or low pH, diazinon has a short half-life; however, at a neutral pH it has a long half-life. In soil, the half-life of diazinon ranges from 2 to 6 wk.[32,44] Generally, after six months, less than 10% of diazinon still remains.[32] Contamination of soil occurs either by direct application as soil insecticide or by runoff from treated plants.[44] Diazinon does not move freely in soil with water, and loss by leaching does not appear to be a major factor in its disappearance from soil.[46] Instead, the primary pathway of degradation in both soil and water is hydrolysis.[32]

As can be seen in Table 15, the maximum concentration detected in world monitoring studies (60 µg/L) is below toxic levels (assuming that a 70-kg human consumes 15 L of water per day.) Given its typical concentrations and its persistence in water (half-life = 14 d at pH 6.0), diazinon does not appear likely to cause poisoning of military personnel. Data from chronic oral-toxicity studies do not suggest that diazinon is oncogenic.[47]

<u>Dieldrin</u>. Dieldrin is a nonsystemic soil insecticide. No data on water metabolites were found. However, Sanborn <u>et al.</u>[48] state that dieldrin itself is one of the most persistent chlorinated pesticides.

Table 15. Dose-response data for diazinon.

Equivalent expressions for dose[a]			
Food contaminant [mg/(kg•day)]	Water concentration[b] (µg/L)	Response[c]	Ref.
0.002	9	Acceptable Daily Intake (ADI)	21,33
0.020[d]	93	No effect	34
0.05	230	Minimal effect, 40% depression of plasma cholinesterase	46
11	51,000	Severe poisoning	34
90 to 444	420,000 to 2,000,000	Death	34

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 60 µg/L (see Appendix C); solubility of diazinon in water: 40,000 µg/L.

[c] Human dose-response unless otherwise indicated.

[d] Some poisoning episodes, either in connection with formulations, or with the susceptibility of children, or both, cast doubt on this conclusion.

Preharvest uses of dieldrin include soil treatment against various insects, and seed treatment of grains, sugar beets, leeks, and onions. In addition, dieldrin is used in foliar treatment of agricultural crops, fruits, nursery stocks, and ornamentals. In tropical and subtropical regions, dieldrin controls disease vectors and locusts.[49] The worldwide use pattern of dieldrin has changed considerably during the last few years because of restrictions in many countries.[49] Therefore, it is difficult to assess the areas of greatest use.

In comparison with other pesticides, many water-concentration values were reported for dieldrin in the open literature. For example, average reservoir-water levels in Israel range from "not detected" to 0.0002 µg/L, and groundwater levels in Egypt ranged from "not detected" to 0.3 µg/L. The highest level of dieldrin, 1.03 µg/L, was found in drinking waters in the Virgin Islands. According to the authors of the article in which this concentration was reported, the "water may be imported from areas like Puerto Rico, where insecticide use is probably more common."[50] The next highest value, 0.5 μg/L, was found in canal water in Malaysia. The solubility of dieldrin in water is 186 μg/L.[51] Therefore, it is reasonable to assume that a maximum concentration of 1.03 μg/L or higher could be attained in the aquatic environment.

As mentioned earlier, dieldrin is one of the most persistent chlorinated pesticides. Few data are available on the biodegradation of dieldrin. We do know that the biodegradation process is very slow and may be the ultimate loss process in sediments. In contrast, volatility (half-life of a few days or hours) and photolysis (half-life of 2 mo) are the principal processes that remove dieldrin from aquatic systems.[29,52] Processes such as oxidation and hydrolysis do not significantly affect that fate of dieldrin.

Health effects in humans from exposure to dieldrin have been investigated.[53-55] Hunter et al.[55] found that patients given 0.211 mg/(kg•d) of dieldrin for two years did not show any clinical effects (e.g., body weight, clinical chemistry, and hematological findings, including plasma alkaline phosphatase and EEG changes). Assuming that a 70-kg man drinks 15 L of water per day, 0.211 mg/(kg•d) corresponds to 980 μg/L (see Table 16). In addition, Jager[54] found that men in the workplace could tolerate 0.0332 mg/(kg•d) (corresponding to 155 μg/L) for up to 15 y. WHO's 1977 Acceptable Daily Intake (ADI) is 0.0001 mg/kg, corresponding to 0.47 μg/L.[21] Dieldrin produced liver tumors in mice, and this has been confirmed in several studies.[36] Tests on other species and human epidemiology studies were considered inconclusive.[36]

The highest concentration reported in the literature (1.03 μg/L) is at or below the no-effect concentrations listed in Table 16. Thus, ingesting water with the highest concentration of dieldrin found is not expected to cause adverse effects. Convulsions, followed by recovery, were observed at 23 mg/(kg•d), corresponding to 107,000 μg/L (again assuming that a 70-kg human drinks 15 L of water per day). However, this value exceeds the maximum solubility value for dieldrin (186 vs 107,000 μg/L). Typical dieldrin levels appear more likely to be near the median, 0.008 μg/L (antilog of the mean of the natural logarithms of the highest reported values, see Appendix C, Table C-20), which is well below the level corresponding to the ADI. Therefore, dieldrin in drinking water is not considered likely to endanger the health or performance of military personnel.

Endrin. Endrin is a nonsystemic insecticide. Patil et al.[56] obtained an unknown metabolite of endrin in a 36% yield from marine fish-pond water. Unfortunately, no other water metabolite data are available.

Endrin is used mainly on field crops and in particular on cotton.[51] It is also used for rice, small cereal grains, and sugar cane.[57] Endrin is effective against a wide range of insect species. In addition, endrin is used as a soil insecticide.[23]

Table 16. Dose-response data for dieldrin.

Equivalent expressions for dose[a]			
Food contaminant [mg/(kg•day)]	Water concentration[b] (μg/L)	Response[c]	Ref.
0.0001	0.47	Acceptable Daily Intake (ADI)	49
0.0332	155	Tolerated for 15 y	50
0.211	980	No clinical effect level (2 y)	55
23	107,000	Convulsions, child (with recovery; single dose)	34
65	303,000	Death	26

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 1.03 μg/L (see Appendix C); solubility of dieldrin in water: 186 μg/L.[51]

[c] Human dose-response unless otherwise indicated.

Concentrations of endrin reported in the open literature came from a variety of water types. In many of the waters around the world, endrin is undetectable. However, when detected, values typically are less than 0.012 μg/L. The highest concentration, 1.5 μg/L, was found in Nile River water at Giza in Egypt (see Appendix C). Unfortunately, the authors did not explain the source of the pesticide. Because the solubility of endrin is 230 μg/L,[58] it is reasonable to believe that the maximum reported level or even greater could be attained in water.

Many aspects of the fate of endrin are unknown. For example, no information is available on the oxidation, volatilization, or sorption of endrin in aquatic systems. Similarly, hydrolysis (half-life about 4 y) does not seem to significantly affect the fate of endrin.[59] However, both photolysis and bioaccumulation appear to play significant roles. Bioaccumulation factors on the order of 10^3 to 10^4 have been observed.[29]

Hayes[60] reported that a 0.20- to 0.25-mg/kg dose of endrin causes a single convulsion, and a 1-mg/kg dose of endrin causes repeated, nonfatal convulsions (Table 17).[34] Notice that the water concentration corresponding to the dose that causes a single convulsion (930 to 1200 μg/L) is greater than the maximum solubility

Table 17. Dose-response data for endrin.

Equivalent expressions for dose[a]: Food contaminant [mg/(kg•day)]	Water concentration[b] (μg/L)	Response[c]	Ref.
0.0002	0.90	Acceptable Daily Intake (ADI)	21, 61
0.014	65	Occupational intake standard	34
0.025	120	NOEL (dog)	61
0.20 to 0.25	930 to 1200	Single convulsion	60
4,600	1.00	Repeated, nonfatal convulsions	34
7 to 15	33,000 to 70,000	Acute oral LD50 (rat)	28
30	140,000	Fatal to child	60
86	400,000	Lethal dose	61

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 1.5 μg/L (see Appendix C); solubility of endrin in water: up to 230 μg/L.[58]

[c] Human dose-response unless otherwise indicated.

concentration (230 μg/L). In fact, the dose that causes a single convulsion is greater than the maximum concentration detected, 1.5 μg/L, and much greater than the concentration typically detected (<0.012 μg/L). The IARC reviewed animal studies of endrin carcinogenicity and concluded that one study on rats was negative; they found that two other studies, one on rats and one on mice, were insufficient for evaluation.[36]

Although endrin appears to be relatively persistent in the aquatic environment, solubility parameters reduce the likelihood of endrin rising to a concentration that could cause a toxic response. Moreover, the highest reported concentration of endrin found in world water supplies does not approach toxic levels. Therefore, based on theoretical considerations and the available monitoring data, it seems unlikely that endrin would adversely affect military personnel.

Leptophos. Leptophos is a broad-spectrum, nonsystemic insecticide.[62] Although it was never licensed for general use in the U.S., except for small experimental amounts, leptophos was manufactured here from 1969 until 1976.[34,63] During that period, it was exported to more than 50 countries, including Egypt, Canada, Colombia, Syria, Mexico, Indonesia, and South Vietnam.[63-65] It was used as both a soil and foliar insecticide against a wide range of insects on cotton, vegetables, fruits, and maize.[62,66]

In the open literature, the only reported detection of leptophos was in a brackish pond in Indonesia.[67] Leptophos was deliberately applied to this pond in order to assess its uptake by fish and persistence in the aquatic environment. The maximum concentration detected was 13.47 µg/L, sampled immediately after application (see Appendix C, Table C-42). Since leptophos has a water solubility of 2400 µg/L,[29] it is reasonable to believe that a concentration of 13.47 µg/L could have been obtained in the aquatic environment.

Studies indicate that leptophos is a moderately persistent insecticide. One study showed that after 4 mo, 40 to 100% of the original amount of leptophos remained unchanged in waters from the Nile River, irrigating canals, and in drainage waters.[68] The principal photodegradation products have been identified as: desbromoleptophos, leptophos oxon, o-methylphenylphosphonothioic acid, o-methylphenylphosphonic acid, 4-bromo-2,5-chlorophenol, and 2,5-dichlorophenol.[69] Leptophos is estimated to have a soil persistence of approximately 2 mo.[70] In laboratory soil-column studies, leptophos possessed little downward mobility.[70]

Animal dose-response data for leptophos are presented in Table 18. Toxicity data are included not only for the rat but also for the hen, since the hen is considered to be the most sensitive experimental animal for studying delayed-neurotoxicity syndrome.[74] The results indicate that the maximum concentration detected in world monitoring studies (13.47 µg/L) is well below the toxic level for either rats or hens. However, reports have shown that desbromoleptophos, a photodegradation product, appears to be 8 to 10 times more active as a delayed neurotoxin in hens than leptophos itself.[75] Moreover, the extensive use of leptophos in Egypt (about 8098 metric tons applied from 1966 to 1975) is associated with the demyelinating effect and subsequent death in 1971 of more than 1200 water buffalo that drank leptophos-contaminated water.[65,75]

Private communications with Velsicol Chemical Corp., which discontinued production of leptophos in 1976, indicated that leptophos is no longer manufactured anyplace in the world.[76] In light of this information, leptophos is unlikely to be found in present world water supplies and is considered unlikely to pose a health hazard to military personnel from ingestion of drinking water.

Table 18. Dose-response data for leptophos.

Equivalent expressions for dose[a]					
Food contaminant [mg/(kg•day)]	Water concentration[b] (μg/L)	Response	Exposure period	Species	Ref.
0.001	4.67	Acceptable Daily Intake (ADI)	Lifetime	Human	21,62
1.5	7,000	Slight inhibition of red cell, plasma, and brain cholinesterase	12 wk in diet	Rat	34
4.4	20,500	No effect	12 wk in diet	Rat	34
24 to 91	110,000 to 420,000	Acute oral LD50		Rat	71
50	230,000	No effect	Single dose	Hen	72
5 to 10	23,000 to 47,000	Ataxia	4 mo in diet	Hen	72
180	840,000	Threshold ataxia	Single dose	Hen	73
4,700	22,000,000	Oral LD50		Hen	34

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 13.47 μg/L (see Appendix C); solubility of leptophos in water: 2400 μg/L.[29]

Lindane. The insecticide lindane is the gamma-isomer of 1,2,3,4,5,6-hexachlorocyclohexane (HCH). The term "benzene hexachloride" (BHC) is often used when referring to HCH. Eight steric isomers of HCH have been isolated from the technical HCH mixture, which also may contain small amounts of heptachlorocyclohexane and octachlorocyclohexane. The composition of the technical mixture is somewhat variable. Even though the gamma-isomer (lindane) is the insecticidally active form, the technical HCH mixture is also sometimes applied as an insecticide. Findings of HCH in water samples were reported as "total HCH" or as concentrations of the alpha-, beta-, and gamma-isomers (see Appendix C). The alpha- and beta-isomers are environmental transformation products of lindane,[29] but their presence in water could also result from the application of technical HCH.

Lindane is commonly used against a wide variety of pest problems, including insects in cotton, rice, seeds, soil, and wood, as well as household insects. It is also used to control vector-borne diseases such as malaria.[28,34] Because of its multiple and large-volume uses in many countries, lindane is likely to be encountered almost anywhere. High levels of lindane in water may result from its direct application to water in mosquito control or from its use on rice.[34,45]

Most of the lindane concentrations reported in the open literature are from samples of surface water, primarily from rivers (see Appendix C, Table C-7). Levels of up to 1 to 2 μg/L were occasionally detected, but most measurements were well below 1 μg/L. In one instance, however, a maximum lindane concentration of 7.1 μg/L was found in surface water in West Berlin (see Table C-7, p. 88). Groundwater samples from Israel and Egypt also contained only low levels of lindane, occasionally reaching concentrations of 1 to 2 μg/L. The highest levels (1920 μg/L) were found in rice-paddy water following the application of lindane (see Table C-7, p. 89) and in potable water tanks near rice paddies (1200 μg/L). Water concentrations even higher than the highest described here are possible since lindane is soluble in water to the extent of about 7 to 12 mg/L.[29]

Lindane cannot be expected to rapidly dissipate from water. For example, in the rice paddy mentioned above, the lindane level had only diminished to 1050 μg/L nine days after Teimoory and Hosseiny-Shekarabi.[45] measured levels of 1920 μg/L. The processes of hydrolysis, oxidation, and photolysis do not appear to degrade significant amounts of lindane in the environment. Lindane is removed from water by volatilization and adsorption to suspended solids, which eventually settle out of the water column. Microorganisms in bottom sediments then transform and degrade the lindane molecule.[29,77]

Almost all of the lindane concentrations reported in the open literature are below the levels that might have adverse toxicological effects. The Acceptable Daily Intake (ADI) for lindane is 0.01 mg/kg (see Table 19).[78] This daily dose corresponds to a concentration of 47 μg/L (assuming that a 70-kg adult consumes 15 L of water per day). The EPA interim standard for lindane is 4.0 μg/L.[47] As mentioned above, reported concentrations rarely exceed 1 to 2 μg/L. Technical HCH and lindane are carcinogenic in mice.[35] Studies linking technical HCH and lindane to cancer in humans were considered inconclusive by an IARC review committee.[35]

Based on the data in Table 19, the highest lindane concentrations reported in the open literature could cause performance-degrading health effects. For example, ingestion of 30 to 40 mg of lindane per day by a group of 15 humans produced adverse effects in six individuals, including convulsions in two.[34,80] A dose of 30 mg/day

Table 19. Mammalian dose-response data for lindane.

Equivalent expressions for dose[a] Food contaminant [mg/(kg•d)]	Water concentration[b] (μg/L)	Response	Species	Ref.
0.01	47	Acceptable Daily Intake (ADI)	Human	21,78
0.43 to 0.57[c]	2,000 to 2,700	Minimum toxic dose; 6 of 15 poisoned, 2 with convulsions	Human	34
1.25	5,800	No toxic effect	Rat	78
1.6	7,400	No toxic effect	Dog	78
400[d]	1,900,000	Mean fatal dose	Human	79

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 1920 μg/L (see Appendix C); solubility of lindane in water: 7.8 mg/L at 25°C.

[c] Reported as 30 to 40 mg/person.

[d] Reported as 28 g/adult.

administered to a 70-kg adult, is equivalent to a drinking-water concentration of 2000 μg/L being consumed at a rate of 15-L/day water. Concentrations approaching 2000 μg/L have been measured in water in agricultural areas, particularly rice paddies.

Lindane (and technical HCH) is one of the most heavily used insecticides outside of the U.S. It is soluble in water at levels well above toxic levels, and high levels can persist in water for periods of at least a week, if not longer. In addition, levels likely to produce acute toxicity have been measured in agricultural waters. Levels in flowing rivers and ground water are apparently much lower. Thus, it appears that lindane presents a potential risk of performance degradation to military personnel as a result of foreign water-supply contamination, particularly agricultural waters.

Malathion. Malathion is one of the most widely used organophosphate insecticides. It is a broad-spectrum insecticide used on crops, in homes, and for mosquito control, especially in areas where the mosquitoes have developed resistance to DDT and BHC. Because of its relatively low toxicity to mammals, malathion is also commonly used against animal ectoparasites, including lice on humans.[28,47,81]

Malathion levels in foreign waters reported in the open literature are typically very low; in 10 of 16 reports listed in Appendix C, it was not detected. With one exception, the highest level found was an average value of 0.3 µg/L. The exception was a finding of 1600 µg/L reported as an average value for a rural pond in India.[37] The report did not include a description of the events leading to the high malathion level.

Levels of 1600 µg/L and higher are not unreasonable since the solubility of malathion in water is 145,000 µg/L.[82] The persistence of high levels is variable and will depend on factors such as the pH, biological activity of the water, and other factors.[83] Studies examining the persistence of malathion in water reported findings such as a half-life of less than 1 wk in a raw-water sample, almost complete degradation in 10 d, 75% reduction in 1 wk, and complete reduction in 4 wk.[47,83] In another report, malathion sprayed on a log pond was reported to be effective against mosquitoes for up to 6 wk.[47] The National Academy of Science commented that malathion is generally degraded faster in water than other organophosphate pesticides, but the production and persistence of metabolites is largely uninvestigated.[47]

The only toxic effects firmly attributable to malathion itself are nervous system problems caused by the accumulation of acetylcholine.[81] Some malathion formulations proved to be unusually toxic, and this was attributed to contaminants (e.g., isomalathion).[81] The available information on carcinogenicity does not provide evidence that malathion is likely to present a carcinogenic risk to humans.[84] Most reported levels of malathion in water are well below those that are considered by WHO to be safe for long-term exposures. However, a dose equivalent to one a 70-kg adult would receive by consuming water containing the highest reported levels (1600 µg/L) at a rate of 15 L/d did produce a 25% reduction in plasma cholinesterase activity within 2 wk. The exposures to this dose continued for 56 d and, while cholinesterase remained depressed, there were no clinical effects observed or reported in the exposed individuals (see Table 20).[85] Clinical symptoms of acute organophosphate poisoning (i.e., blurred vision, headache, nausea, vomiting) do not usually appear until cholinesterase levels are depressed to 50% or less of baseline levels.[81] The highest levels of malathion reported in the literature probably would cause biochemically detectable changes (i.e., depressed cholinesterase levels), but probably would not cause performance degradation in troops. However, troops with depressed cholinesterase levels would be more susceptible to other cholinesterase-inhibiting pesticides or agents.

Table 20. Dose-response data for malathion.

Equivalent expressions for dose[a]			
Food contaminant [mg/(kg•day)]	Water concentration[b] (μg/L)	Response[c]	Ref.
0.02	93	Acceptable Daily Intake (ADI)	21, 86
0.2	900	No adverse effect	86
0.23[d]	1,000	No significant effect in 47 d	85
0.34[e]	1,600	No-discernible-effects threshold for 56-d exposure	85
71[f]	330,000	Minimum fatal dose	47

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 1600 μg/L (see Appendix C); solubility of malathion in water: 145,000 μg/L.[82]

[c] Human dose-response unless otherwise indicated.

[d] Reported as 16 mg/person.

[e] Reported as 24 mg/person.

[f] Minimum fatal dose is estimated to be about 5 g.[47]

Even though malathion is one of the less toxic organophosphorus insecticides, it can be dissolved in water to much higher concentrations than those likely to cause performance-degrading health effects. Considering this and the large amounts of malathion that are used around the world, it is surprising that there were not more reports of high malathion concentrations in water, and that there were not more reports of human poisoning from malathion in drinking water. The relatively short half-life of malathion in water is probably at least partly responsible for this. High levels are unlikely to persist in water for several weeks without continued entry of the pesticide into the water.

Phosphamidon. Phosphamidon is a systemic, broad-spectrum insecticide/acaricide.[23,28] Chemically, it is a mixture of approximately 30% alpha-isomer (trans-phosphamidon) and 70% beta-isomer (cis-phosphamidon); the latter form is more active biologically.[67]

Phosphamidon is used extensively on about every crop grown in the world.[23] It is mainly used against sucking insects in rice, thrips in cotton, and aphids in a wide variety of crops.[23,28]

In the open literature, the maximum concentration reported for phosphamidon in water was 110 μg/L from rice fields in Iran.[45] This was an experimental study designed to evaluate the degradation rate of phosphamidon, applied at 0.75 L/hectare. Immediately after application, residues of 110 μg/L were detected. However, by the third day, the residues had decreased to 50 μg/L and had completely disappeared by the tenth day. No typical concentration level for phosphamidon could be determined because of the absence of detection data in worldwide monitoring literature. Phosphamidon is completely miscible with water.[24]

Phosphamidon finds its way into water supplies primarily by means of surface runoff.[23] Its half-life in water is less than 2 wk.[87] In soil its half-life ranges from 0 to 30 d.[88] No soil metabolites have been reported.[88]

As can be seen in Table 21, the maximum detected concentration (110 μg/L) reported in world monitoring studies does not approach toxic levels. Although phosphamidon is reported to be a cholinesterase inhibitor,[90] there are no reports in the literature of cumulative toxic effects to humans by the oral route.

Based on the relatively low concentration found in water immediately after application of the pesticide on a rice paddy, its short persistence in water, and its low toxicity, phosphamidon in drinking water does not appear to be a likely hazard to military personnel. However, because phosphamidon is completely miscible with water, it would be possible to find a toxic concentration after a spill, deliberate contamination, or some other unusual event.

Toxaphene. Toxaphene is a complicated, chlorinated camphene mixture containing 67 to 69% chlorine.[29] The toxaphene mixture consists of at least 175 different compounds, fewer than ten of which have been identified.[91] Among other names, it is also known as camphechlor.[28]

Toxaphene is manufactured and used in many parts of the world (see earlier discussion of pesticide use). In many countries where it is used, toxaphene is used in very large quantities, often exceeding those of any other pesticide (see Tables 5 and 7). For many years, toxaphene was the pesticide applied in greatest quantity in the U.S. as well.[92] It is used against insects on many crops and herd animals and is used extensively on cotton.[28,34] It is also occasionally used as a rodenticide.[93]

Despite its heavy use around the world, there are very few reports of toxaphene measurements in water samples. This is, in part, attributable to the difficulty of detecting and quantifying something as complex as toxaphene. Because toxaphene is used in such large volumes, we supplemented the monitoring data with reports from the U.S.

Table 21. Dose-response data for phosphamidon.

Equivalent expressions for dose[a] Food contaminant [mg/(kg•day)]	Water concentration[b] (μg/L)	Response	Exposure period	Species	Ref.
0.001	4.67	Acceptable Daily Intake (ADI)	Lifetime	Human	21,61
1.25	5,800	No effect	2 y in diet	Rat	24
2.5	11,700	No effect	90 d	Rat	89
17 to 30	79,000 to 140,000	Acute, oral LD50	--	Rat	89
60 to 120	280,000 to 560,000	No clinical effect	Single dose	Child	34

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 110 μg/L (see Appendix C); solubility of phosphamidon in water: completely miscible with water.[24]

The highest level reported, 20.9 μg/L, was found in runoff from a toxaphene-treated cotton field.[39] A maximum level of 13.7 μg/L was found in a lake that had been treated with toxaphene to get rid of unwanted fish species.[94] Toxaphene could not be detected in samples taken from several different locations in Africa, nor in a sample of potable water in rural Australia (see Appendix C).

The solubility of toxaphene in water is about 500 to 3000 μg/L[29]; thus, levels higher than those in the monitoring data in the open literature are possible. Toxaphene is considered to be moderately persistent. The primary way that toxaphene is removed from water appears to be by sorption onto particles that settle to the bottom, followed by anaerobic degradation in the bottom sediments.[29] Volatilization may also contribute to the disappearance of toxaphene from water in some situations.[29] Thus, toxaphene may only persist in water for a few days, or it could persist for many months.[92]

The ADI for toxaphene is based on a dose to rats that caused no adverse effects. In extrapolating the results from the rat study to a human ADI, a 1000-fold safety factor was applied.[41] As can be seen in Table 22, the dose corresponds to a concentration in water of 5.8 μg/L when 15 L/day of such water is consumed by a 70-kg adult. The EPA

Table 22. Dose-response data for toxaphene.

Equivalent expressions for dose[a]: Food contaminant [mg/(kg•day)]	Equivalent expressions for dose[a]: Water concentration[b] (μg/L)	Response	Exposure period	Species	Ref.
0.00125	5.8	Acceptable Daily Intake (ADI)[c]	Lifetime	Human	41
0.6 to 0.8	2,800 to 3,740	No adverse effect	2 y	Monkey	41
0.6 to 1.5	2,800 to 7,000	No adverse effect	2 y	Dog	41
1	4,600	No adverse effect	13 d[d]	Human	34
3.5 to 10	16,000 to 44,000	Fatal	--	Human	92
4	18,000	Intermittent illness	44 to 106 d	Dog	34

[a] Water concentration is calculated from the food-contaminant dose on the basis of a 70-kg adult consuming 15 L/d of field water.

[b] Maximum water concentration reported: 20 μg/L (see Appendix C); solubility of toxaphene in water: 500 to 3000 μg/L.[29]

[c] Extrapolated from a no-observed-effects dose to rats by using a 1000-fold safety factor.

[d] Experimental aerosol exposure equivalent to a dosage of about 1 mg/(kg•d) administered for 10 consecutive days, followed by 3 wk of no exposure, and then administered again for 3 more days.

established an interim drinking-water standard of 5 μg/L.[47] Solubility considerations and the monitoring data suggest that these levels will be exceeded in water near sites of toxaphene usage, but it appears that levels much higher than these are required for performance degradation, particularly if exposures are limited to one year.

There are few reports of acute or fatal poisonings in humans from toxaphene.[34,47] One study listed in Table 22 revealed no adverse effects in humans exposed by aerosol dose equivalent to about 1 mg/(kg•d) for 13 d total (exposure for 10 consecutive days, followed by 3 wk without exposure, then 3 d of exposure). The same dose would be delivered to 70-kg military personnel consuming 15 L of water per day, containing about 4600 μg/L of toxaphene. Long-term animal studies disclosed no adverse effects at doses that correspond to water concentrations above 2800 μg/L for 70-kg troops consuming up to 15 L/d of water. Frank toxicity in dogs occurred at a dose corresponding to about

18,000 µg/L. Human fatal doses are roughly estimated to be in the range of 3.5 to 9.5 mg/kg of body weight, corresponding to water concentrations above 16,000 µg/L for 70-kg troops consuming up to 15 L/d of water. The no-adverse-effect doses and the frankly toxic doses are at or above the solubility of toxaphene in water and are well above toxaphene concentrations reported in the open literature. The IARC concluded that there is sufficient evidence that toxaphene is carcinogenic in mice and rats and recommends that it is reasonable to treat toxaphene as if it presented a carcinogenic risk to humans.[35]

The monitoring data show that toxaphene concentrations occasionally exceed those that would be safe for a lifetime exposure (5.8 µg/L). However, levels of toxaphene in water that would cause performance degradation or irreversible health effects in troops appear to be unlikely.

DISCUSSION AND CONCLUSIONS

The monitoring data and accompanying information concerning concentrations of pesticides in foreign water supplies provides insight into the situations likely to result in high contamination levels. Combined with details about pesticide sales, environmental persistence, and other pertinent information, important characteristics of the potential for troop exposure to pesticides in field water can be inferred. Then, evaluations of the toxic doses and effects of pesticides will indicate which pesticides are most likely to degrade troop performance as a consequence of such exposure. The basic conclusion drawn from the available data is that while pesticide contamination is widespread, it is only rarely severe enough to threaten troops' health. The challenge to military health officers is to detect and avoid the apparently rare cases of extremely contaminated water.

Although many different pesticides were found in large bodies of water such as rivers, streams, lakes, aquifers, and oceans, the levels of the pesticides measured in these waters typically were below both the ADI- and LD50-based screening concentrations, except for leptophos (see Tables 23 and 24). However, leptophos has not been manufactured since 1976, and the one reported detection level was immediately after its application; hence, its typical concentration is likely to be below the screening level. Therefore, ingestion of typical pesticide concentrations in water by military personnel for periods lasting up to 7 d or up to 1 y should not degrade performance or, it would appear, produce any other acute or subchronic health effects. Some of the pesticides may, however, cause effects that have nonthreshold mechanisms (e.g., cancers), and exposure to these pesticides at even low levels would entail some incremental risk. Nevertheless,

Table 23. Comparison between ADI-based and LD50-based screening concentrations and highest monitored concentrations below these screening levels. (Substances are presented alphabetically).

Substance	(Table in App. C)	Screening concentration (C_s, µg/L) ADI-based	Screening concentration (C_s, µg/L) LD50-based	Highest monitored concentration (µg/L) below both ADI- and LD50-based C_s values	Percentage of highest monitored levels ≤ the one that is below both C_s values	Number of locations sampled
Aldrin	(C-01)	5.0E-01	3.9E+02	2.0E-01	97	65
Bayluscide	(C-02)	---	---	Not detected	100	2
Benthiocarb	(C-03)	---	1.9E+02	3.6E+00	88	8
BHC	(C-04)	---	---	6.5E-01	98	87
alpha-BHC	(C-05)	---	1.8E+01	9.1E-01	90	129
beta-BHC	(C-06)	---	6.0E+02	9.0E-01	90	51
gamma-BHC (Lindane)	(C-07)	4.7E+01	7.6E+00	9.0E-01	93	193
Captafol	(C-42)	4.7E+02	2.5E+02	Not detected	100	1
Captan	(C-08)	4.7E+02	9.0E+02	Not detected	100	2
Carbaryl	(C-09)	4.7E+01	2.5E+01	4.0E-01	100	3
Chlordane	(C-10)	4.7E+00	2.8E+01	Not detected	100	3
cis-Chlordane	(C-11)	---	---	1.0E-01	100	22
beta trans-Chlordane	(C-12)	---	---	5.0E-01	100	22
Chlorobenzilate	(C-42)	9.3E+01	7.0E+01	Not detected	100	1
CNP	(C-13)	---	1.1E+03	2.0E+00	89	9
2,4-D	(C-14)	1.4E+03	3.7E+01	2.2E-01	100	2
DDMU	(C-42)	---	---	2.0E-02	100	1
p,p'-DDT	(C-18)	2.3E+01	8.7E+00	9.6E-01	97	314
o,p'-DDT	(C-17)	---	---	9.5E-01	100	46
p,p'-DDD	(C-15)	---	1.1E+01	8.3E-01	96	136
o,p'-DDD	(C-42)	---	---	6.0E-02	100	1
p,p'-DDE	(C-16)	---	8.8E+01	9.5E-01	97	159
o,p'-DDE	(C-42)	---	---	3.0E-02	100	1
Diazinon	(C-19)	9.3E+00	6.6E+00	5.0E-02	91	11
Dichlorvos	(C-42)	1.9E+01	3.2E+00	Not detected	100	1

Table 23. (Continued)

Substance (Table in App. C)		Screening concentration (C_s, μg/L) ADI-based	LD50-based	Highest monitored concentration (μg/L) below both ADI- and LD50-based C_s values	Percentage of highest monitored levels ≤ the one that is below both C_s values	Number of locations sampled
Dieldrin	(C-20)	5.0E-01	4.0E+00	4.0E-01	99	140
Dimethoate	(C-21)	9.3E+01	1.5E+01	8.0E-02	100	3
Endosulfan	(C-22)	3.5E+01	1.8E+00	5.5E-01	100	16
alpha-Endosulfan	(C-23)	---	---	2.5E-01	95	38
beta-Endosulfan	(C-24)	---	---	1.0E-01	94	35
Endrin	(C-25)	9.1E-01	3.0E-01	5.0E-02	93	28
EPN	(C-26)	---	8.0E-01	Not detected	100	2
Fluometuron	(C-27)	---	8.9E+02	6.0E+01	83	6
Fluridone	(C-28)	---	---	5.0E+01	100	2
Heptachlor	(C-29)	2.3E+00	4.0E+00	7.0E-01	100	64
Heptachlor epoxide	(C-30)	2.3E+00	4.7E+00	4.0E-02	100	60
Hexachlorobenzene	(C-31)	---	1.0E+03	1.4E-01	100	17
Leptophos[a]	(C-42)	4.7E+00	3.0E+00	1.3E+01	---	1
Malathion	(C-32)	9.3E+01	3.7E+01	3.0E-01	94	16
Methoxychlor	(C-33)	---	5.0E+02	Not detected	100	5
Mevinphos	(C-34)	7.0E+00	3.0E-01	Not detected	100	2
Monocrotophos	(C-42)	2.8E+00	8.0E-01	Not detected	100	1
Oxadiazon	(C-35)	---	3.5E+02	1.9E+00	100	6
Parathion	(C-36)	2.3E+01	2.0E-01	7.0E-02	100	39
Parathion, dimethyl	(C-37)	4.7E+00	6.0E-01	1.7E-01	50	4
PCP-Na	(C-42)	---	---	Not detected	100	1
Phosphamidon	(C-38)	4.7E+00	1.5E+00	Not detected	50	2
Toxaphene	(C-39)	---	4.0E+00	2.2E+00	89	18
Trifluralin	(C-40)	---	5.0E+02	8.0E-01	100	8
Trithion	(C-41)	---	7.0E-01	Not detected	100	2

[a]Leptophos has not been manufactured since 1976[76], and the highest monitored concentration for leptophos was detected immediately after its application. Therefore, it is likely that leptophos concentrations in water typically will be below the screening concentrations.

Table 24. Comparison between ADI-based and LD50-based screening concentrations and highest monitored concentrations below these screening levels. (Substances are presented in order of the number of locations sampled).

Substance	(Table in App. C)	Screening concentration (C_S, µg/L) ADI-based	Screening concentration (C_S, µg/L) LD50-based	Highest monitored concentration (µg/L) below both ADI- and LD50-based C_S values	Percentage of highest monitored levels ≤ the one that is below both C_S values	Number of locations sampled
p,p'-DDT	(C-18)	2.3E+01	8.7E+00	9.6E-01	97	314
gamma-BHC (Lindane)	(C-07)	4.7E+01	7.6E+00	9.0E-01	93	193
p,p'-DDE	(C-16)	---	8.8E+01	9.5E-01	97	159
Dieldrin	(C-20)	5.0E-01	4.0E+00	4.0E-01	99	140
p,p'-DDD	(C-15)	---	1.1E+01	8.3E-01	96	136
alpha-BHC	(C-05)	---	1.8E+01	9.1E-01	90	129
BHC	(C-04)	---	---	6.5E-01	98	87
Aldrin	(C-01)	5.0E-01	3.9E+00	2.0E-01	97	65
Heptachlor	(C-29)	2.3E+00	4.0E+00	7.0E-01	100	64
Heptachlor epoxide	(C-30)	2.3E+00	4.7E+00	4.0E-02	100	60
beta-BHC	(C-06)	---	6.0E+02	9.0E-01	90	51
o,p'-DDT	(C-17)	---	---	9.5E-01	100	46
Parathion	(C-36)	2.3E+01	2.0E-01	7.0E-02	100	39
alpha-Endosulfan	(C-23)	---	---	2.5E-01	95	38
beta-Endosulfan	(C-24)	---	---	1.0E-01	94	35
Endrin	(C-25)	9.0E-01	3.0E-01	5.0E-02	93	28
beta trans-Chlordane	(C-12)	---	---	5.0E-01	100	22
cis-Chlordane	(C-11)	---	---	1.0E-01	100	22
Toxaphene	(C-39)	---	4.0E+00	2.2E+00	89	18
Hexachlorobenzene	(C-31)	---	1.0E+03	1.4E-01	100	17
Endosulfan	(C-22)	3.5E+01	1.8E+00	5.5E-01	100	16
Malathion	(C-32)	9.3E+01	3.7E+01	3.0E-01	94	13
Diazinon	(C-19)	9.3E+00	6.6E+00	5.0E-02	91	11
CNP	(C-13)	---	1.1E+03	2.0E+00	89	9
Benthiocarb	(C-03)	---	1.9E+02	3.6E+00	88	8
Trifluralin	(C-40)	---	5.0E+02	8.0E-01	100	8
Fluometuron	(C-27)	---	8.9E+02	6.0E+01	83	6
Oxadiazon	(C-35)	---	3.5E+02	1.9E+00	100	6
Methoxychlor	(C-33)	---	5.0E+02	Not detected	100	5

Table 24. (Continued)

Substance (Table in App. C)		Screening concentration (C_s, μg/L) ADI-based	Screening concentration (C_s, μg/L) LD50-based	Highest monitored concentration (μg/L) below both ADI- and LD50-based C_s values	Percentage of highest monitored levels ≤ the one that is below both C_s values	Number of locations sampled
Parathion, dimethyl	(C-37)	4.7E+00	6.0E-01	1.7E-01	50	4
Carbaryl	(C-09)	4.7E+01	2.5E+01	4.0E-01	100	3
Chlordane	(C-10)	4.7E+00	2.8E+01	Not detected	100	3
Dimethoate	(C-21)	9.3E+01	1.5E+01	8.0E-02	100	3
2,4-D	(C-14)	1.4E+03	3.7E+01	2.2E-01	100	2
Bayluscide	(C-02)	---	---	Not detected	100	2
Captan	(C-08)	4.7E+02	9.0E+02	Not detected	100	2
EPN	(C-26)	---	8.0E-01	Not detected	100	2
Fluridone	(C-28)	---	---	5.0E+01	100	2
Mevinphos	(C-34)	7.0E+00	3.0E-01	Not detected	100	2
Phosphamidon	(C-38)	4.7E+00	1.5E+00	Not detected	50	2
Trithion	(C-41)	---	7.0E-01	Not detected	100	2
Captafol	(C-42)	4.7E+02	2.5E+02	Not detected	100	1
Chlorobenzilate	(C-42)	9.3E+01	7.0E+01	Not detected	100	1
DDMU	(C-42)	---	---	2.0E-02	100	1
Dichlorvos	(C-42)	1.9E+01	3.2E+00	Not detected	100	1
Leptophos[a]	(C-42)	4.7E+00	3.0E+00	1.3E+01	---	1
Monocrotophos	(C-42)	2.8E+00	8.0E-01	Not detected	100	1
o,p'-DDD	(C-42)	---	---	6.0E-02	100	1
o,p'-DDE	(C-42)	---	---	3.0E-02	100	1
PCP-Na	(C-42)	---	---	Not detected	100	1

[a]Leptophos has not been manufactured since 1976[76], and the highest monitored concentration for leptophos was detected immediately after its application. Therefore, it is likely that concentrations in water typically will be below the screening concentrations.

on the basis of our assessment of the typical concentrations for pesticides in water and their toxicity following ingestion, we conclude that treatment of foreign water supplies specifically to remove pesticides need not be performed routinely.

Thus the greatest threat to troop health from pesticides in water results from the infrequent, transient occurrence of extreme contamination. The fact that such contamination exists is documented in our earlier discussions of health incidents from pesticide-contaminated water (Table 11) and in the collected monitoring data (Appendix C). Acute intoxications from pesticides in drinking water produced effects such as nausea, vomiting, headache, weakness, and blurred vision (see previous discussion of pesticide-contamination incidents). Two fatalities were reported (Table 11).

The chances of suffering these effects can be reduced by avoiding potential sources of drinking water that may be associated with extreme pesticide contamination. For example, some of the highest pesticide levels reported in the monitoring data (Appendix C) were found in small bodies of water in agricultural areas. These waters have high potential for contamination and little potential for dilution. In fact, pesticide leachate and runoff in wells near agricultural activities caused some of the poisoning incidents described in Table 11. There are other situations that could potentially result in extreme pesticide contamination of water, such as the direct application of pesticides to water to control malaria-bearing mosquitoes, schistosome-bearing snails, or aquatic weeds. There are also unconfirmed reports from Africa and South America of people adding pesticides to rivers and lakes to stun or kill fish, which then float to the top and are collected for consumption. Consequently, field personnel looking for water supplies should be wary of using small bodies of water in agricultural areas, and they should be alert to the possibility of extreme contamination levels when they are in areas with water that may require direct application of pesticides.

However, it may not always be possible to avoid using small agricultural ponds or ditches. Usually it will not be obvious that water has recently been sprayed for pest control or that a well has been badly contaminated. Thus, in order to prevent the use of water with extreme pesticide content, field methods for detecting gross pesticide contamination are needed. However, developing suitable detection methods is very difficult because there are so many different pesticides that are used around the world and can be found in water (see Table 12 and Appendix C).

The organophosphates are a candidate class of pesticide for field detection because of their acute toxicity and widespread use, estimated to be 60% of pesticide use outside of the U.S. and Western Europe by 1990.[9] Field methods may already exist for detecting total organophosphates in water.[95] The organochlorines are also widely used, particularly in the developing countries. For example, BHC and DDT are estimated to constitute 50%

of the pesticides used in India.[96] The organochlorines do not lend themselves to field detection. Their detection requires equipment (e.g., gas chromatographs) that is not normally available in the field. However, immunoassay techniques may be the basis for future development of field methods for individual organochlorine pesticides.

If the military undertakes research to develop organochlorine-pesticide detection capabilities, lindane appears to be the best pesticide for initial consideration. Lindane is used in large quantities in practically all parts of the world, and it is soluble in water at levels well above acutely toxic concentrations. Of all the pesticides, lindane has the greatest likelihood of being present at toxic levels and consequently appears to pose the greatest threat to troop health. The other organochlorine pesticides used in very large amounts, DDT and toxaphene, appear to present less significant risks.

An important issue related to the detection of high pesticide contamination is the extent to which taste and odor can be relied upon to protect against the use of dangerously contaminated waters. Two separate incidents involving the contamination of public-water supplies, with resulting illness, suggest that odor cannot be used as a reliable warning, at least not for all pesticides. In one case, local health officials received complaints that the water tasted like gasoline or kerosene.[16] In the other case, one resident complained that the tap water was milky white and smelled like insecticide spray.[15] The water contaminant in both of these incidents was chlordane, which has a reported odor threshold of 0.5 to 2.5 µg/L (see Appendix B). The chlordane concentrations that caused these poisonings were up to 6600 µg/L in one case[16] and up to 1.2×10^6 µg/L in the other.[15] In both incidents, however, the pesticide concentrations were above organoleptic detection thresholds and were high enough to give the water an objectionable taste. Nevertheless, at least some people still drank enough of the pesticide-containing water to suffer a toxic reaction. The foul taste brought the situations to the attention of public health officials and no doubt served to limit the extent of exposure; however, the fact remains that some people still chose to drink the water and were poisoned. This demonstrates that taste and odor cannot be relied upon to protect the individual soldier against all dangerously high pesticide contaminations.

RECOMMENDATIONS FOR FURTHER RESEARCH

1. Protection against the use of water highly contaminated by pesticides requires the ability to detect contamination. Because there are so many individual pesticides that could be present, techniques for detecting classes or groups of pesticides would be of greatest practicality in determining that a water source is safe to drink.

2. Some pesticides are used widely enough and are toxic enough to warrant the development of field-detection techniques for individual pesticides. Lindane is the most notable among these, but the development of tests for some of the other pesticides likely to be present at high concentrations should also be considered. The new immunoassay techniques appear to be promising for this purpose.

3. There may be situations in which the only available water is highly contaminated by pesticides. The treatability of pesticides most likely to be contaminating the water should be evaluated. Lindane is the most notable among these, but the organophosphates (e.g., malathion and parathion) should also be considered for study.

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APPENDIX A
PESTICIDE USE--INFORMATION SOURCES

The literature of pesticide usage statistics is voluminous. At present, there is no single guide to this subject on a worldwide basis. In the following sections, the characteristics of available pesticide data sources and their use in this project will be discussed. These data sources and information gathered from various journal articles have provided a basis for the selection of pesticides to be further examined and screened.

I. International

A. FAO Production Yearbook.[1] This compilation is the most complete annual record of world agricultural statistics. It is compiled from national reports. Pesticide data generally refer to pesticides used in, or sold to agriculture by country. They are shown in terms of active ingredients, except for some countries where data refer to formulation weights. Unfortunately, only a few major organochlorines (DDT, BHC, HCB, lindane, aldrin, and toxaphene) and some organophosphorus compounds (parathion and malathion) are identified individually. All other pesticides are listed by group such as pyrethrum, botanical insecticides, arsenicals, carbamate insecticides, etc. This compilation has been very useful in identifying pesticide usage in foreign countries.

B. Summary of Replies to the Questionnaire on Good Agricultural Practice in the Use of Pesticides in the Production of Some Important Selected Foods.[2] This document was prepared for the Joint FAO/WHO Food Standards Program, Codex Alimentarius Commission by the Canadian Delegation to the Codex Committee on Pesticide Residues. It provides statistical tabulations on (1) crop-pesticide-country, (2) country-crop, (3) pesticide-crop, and (4) pesticide-country. There were 34 countries cooperating in this survey. However, not all of the major crops were included.

C. Farm Chemicals. This monthly trade journal periodically publishes an exclusive report on U.S. and world markets by crop, type of pesticide, and area of the world. Its statistics and forecasts are based on confidential surveys of leading international marketers. The last report, "A Look At World Pesticide Markets," was issued in 1981.[3] In this report, the five largest single-crop markets worldwide in 1980 were identified as corn, rice, cotton, soybeans, and wheat. Further, it projected that by

1985 worldwide sales would top $14.5 billion and that U.S. sales would exceed $4.4 billion at the user's level. Big increases were also projected for Brazil, the People's Republic of China, Mexico, and Japan.

D. GIFAP Bulletin.[4] This is the official publication of the International Group of National Associations of Agrochemical Manufacturers. Issued monthly in Brussels, Belgium, it covers all aspects of agricultural chemicals. Information on production, supply, marketing, and use of pesticides in various member countries is provided periodically by types of pesticides. Specific crop-pesticide information is provided periodically. It is a good source for data on marketing and supply of pesticides on an international basis.

E. Future World Market Demands for Pesticides and Their Specific Roles in Crop Protection.[5] This is perhaps the only publication that provides data on pesticide usage by geographical regions of the world. Although the report was published in 1975, it does contain a comprehensive review of the status of the world market for pesticides at that time. It also gives some tentative estimates of the likely demand for each of the main classes of pesticides up to 1990, arranged by chemical types, selected countries, and some major crops.

II. United States

A. U.S. Department of Agriculture Publications

1. The Pesticide Review.[6] This is an annual statistical compilation of pesticide use, production, and trade in the U.S., issued by the Department's Stabilization and Conservation Service since 1952. This publication is probably the most widely used and quoted source of data on pesticides, their production, and use in the United States. Until 1978 it was usually published about 18 months after the end of the most recent years for which data were included. Unfortunately, the 1978 report was the last one issued.

2. Farmer's Use of Pesticides.[7] This is a periodic farm survey on the use of pesticides on different crops and classes of livestock in different areas. These data were to provide a basis for estimating the costs and benefits of pesticides and to serve as a measure of change in pesticide use. To date, five separate surveys have been published:

1964, 1966, 1971, 1976, and 1982. Major uses are listed by types of pesticides and by crops. These surveys are the most comprehensive available on pesticide use in this country. Unfortunately, the 1982 survey excluded California and twelve other states in its estimates.

3. Farm Pesticide Supply-Demand Trends.[8] This report is prepared annually to show the pesticide situation and outlook information. Supply data are based on a survey of pesticide manufacturers and on discussions with distributors, while demands are based on January farmer planting intentions and on available data on use rate. One of the most helpful tables lists herbicide, insecticide, and fungicide usage by crop for the U.S. and the rest of the world in 1980. This provides important information on the relative amount of pesticides used on various crops in the U.S. and the rest of the world. These reports have been issued annually since 1975.

B. U.S. International Trade Commission.

1. Synthetic Organic Chemicals--United States Production and Sales.[9] This annual report covers most synthetic organic chemicals. It does not include inorganic pesticides nor all organic pesticides. Data are reported by producers for only those times where the volume of production or sales exceeds 1000 pounds or the value of sales exceeds $1000. One chapter is devoted to pesticides sales and production by dollar volume and pounds. Very few of the major pesticides are accounted for individually, and most of them are lumped together into large, general categories.

C. U.S. Environmental Protection Agency.

1. The most recent publication issued by EPA, Pesticide Industry Sales and Usage, 1982 Market Estimates[10] provides user expenditures for pesticides, and the volume of active ingredients for U.S. pesticides used by class and sector for 1982.

D. Others

1. The Kline Guide to the Chemical Industry.[11] This guide, revised periodically, provides information on U.S. production, sales, and prices of selected basic toxicants from 1970 to 1979. The pesticide section is limited to synthetic organic toxicants and formulated pesticides.

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APPENDIX B

ORGANOLEPTIC THRESHOLD CONCENTRATIONS IN WATER FOR SEVERAL PESTICIDES

This appendix presents the threshold concentrations in water for the detection of organoleptic (e.g., taste and odor) properties of several pesticides (Table B-1). Odor-detection data thresholds are given for all pesticides listed. In addition, a taste threshold is reported for 2,4-D.

Table B-1. Organoleptic threshold concentrations in water for several pesticides.

Pesticide	Threshold concentration[a]	Ref.
Aldrin	0.017 ppm min. odor	1
Aluminum phosphide	0.00020 mg/L min. odor[b]	2
Chlordane	0.0005 ppm min. odor[c] 0.0025 ppm min. odor[d]	1 1
Chlorpyrifos	0.0008 mg/L min. odor 0.0016 mg/L max. odor 0.0012 mg/L mean odor	3
DDT	0.35 ppm min. odor	1
Dieldrin	0.041 ppm min. odor	1
Dinoseb	0.032 mg/L min. odor[e] 0.08 mg/L max. odor 0.056 mg/L mean odor	3
Endrin	0.018 ppm min. odor	1
Heptachlor	0.02 ppm min. odor	1
Lindane	12.0 ppm min. odor 0.00125 ppm min. odor[f]	1
Malathion	1.0 ppm min. odor	1
Methoxychlor	4.7 ppm min. odor	1
Azinphosmethyl (guthion)	0.0002 ppm min. odor	1
Dimethyl parathion	0.0123 ppm min. odor	1
Oxydemeton	0.01 mg/L min. odor	4
Parathion	0.04 ppm min. odor	1

Table B-1. (Continued)

Pesticide	Threshold concentration[a]	Ref.
Toxaphene	0.14 ppm min. odor	1
	0.0052 mg/L min. odor[g]	5
Trichlorfon	0.01 mg/L min. odor	4
2,4-D	3.13 ppm min. odor	1
	0.01 mg/L min. taste[g]	6
2,4,5-T	2.92 ppm min. odor	1

[a] At 60°C in water unless otherwise indicated.

[b] Aluminum phosphide reacts with water to release phosphine gas, hydrogen phosphide. This value is for phosphine in water.

[c] At 60°C in water; 5% granular.

[d] At 60°C in water; 40% wettable powder.

[e] At 60°C in water; butterscotch odor.

[f] At 60°C in water; 11.7% gamma-isomer, and 13.6% other isomers.

[g] In water; no temperature given.

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APPENDIX C

MONITORING DATA FOR PESTICIDE LEVELS IN WATER

This appendix contains the water-quality monitoring data for the pesticides discussed in this report. The concentration data are for waters outside of the U.S. However, we have included some data for U.S. waters. In Tables C-1 through C-41, if only an average value was given, the maximum column shows zero.

The pesticides in this appendix are arranged alphabetically, except for those pesticides reported only once in the literature, which are listed together in the final table (Table C-42). An alphabetical list of the pesticides, giving the corresponding table number and Chemical Abstracts Service (CAS) registry number, is presented below. The underlined pesticides were subjected to secondary screening.

Compound	Table No.	CAS registry No.	Compound	Table No.	CAS registry No.
<u>Aldrin</u>	C-1	[309-00-2]	<u>Dieldrin</u>	C-20	[60-57-1]
Bayluscide	C-2	[140-04-8]	Dimethoate	C-21	[60-51-5]
Benthiocarb	C-3	[28249-77-6]	Endosulfan	C-22	[115-29-7]
<u>BHC</u>	C-4	[608-73-1]	alpha-	C-23	[969-98-8]
alpha-	C-5	[319-84-6]	beta-	C-24	[33213-65-9]
beta-	C-6	[319-85-7]	<u>Endrin</u>	C-25	[72-20-8]
gamma- (lindane)	C-7	[58-89-9]	<u>EPN</u>	C-26	[2104-64-5]
Captafol	C-42	[2425-06-1]	Fluometuron	C-27	[2164-17-2]
Captan	C-8	[133-06-1]	Fluridone	C-28	[59756-60-4]
Carbaryl	C-9	[63-25-2]	Heptachlor	C-29	[76-44-9]
Chlordane	C-10	[57-74-9]	epoxide	C-30	[1024-57-3]
cis-	C-11	[5103-71-9]	Hexachlorobenzene	C-31	[118-74-1]
trans-	C-12	[5103-74-2]	<u>Leptophos</u>	C-42	[21609-90-5]
Chlorobenzilate	C-42	[510-15-6]	<u>Malathion</u>	C-32	[121-75-5]
CNP	C-13	[1836-77-7]	Methoxychlor	C-33	[72-43-5]
2,4-D	C-14	[94-75-7]	Mevinphos	C-34	[7786-34-7]
DDD, o,p'-	C-42	[53-19-0]	Monocrotophos	C-42	[6923-22-4]
DDD, p,p'-	C-15	[72-54-8]	Oxadiazon	C-35	[19666-30-9]
DDE, o,p'-	C-42	[3424-82-6]	Parathion	C-36	[56-38-2]
DDE, p,p'-	C-16	[72-55-9]	Parathion, dimethyl	C-37	[298-00-0]
DDMU	C-42	[1022-22-6]	PCP-Na	C-42	[608-93-5]
DDT, o,p'-	C-17	[789-02-6]	<u>Phosphamidon</u>	C-38	[13171-21-6]
<u>DDT</u>, p,p'-	C-18	[50-29-3]	<u>Toxaphene</u>	C-39	[8001-35-2]
<u>Diazinon</u>	C-19	[333-41-5]	Trifluralin	C-40	[1582-09-8]
Dichlorvos	C-42	[62-73-7]	Trithion	C-41	[786-19-6]

Table C-1. Monitoring data for aldrin in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ARGENTINA, PARANA RIVER, 600 KM ABOVE THE MOUTH	RIV	14	0.00000	0.02900		LENA84
FRANCE, MEDITERRANEAN SEA, 10 MI. FROM COAST	OCE	40	0.02900	0.18000		MEST83
FRANCE, MEDITERRANEAN SEA, LITTORAL PONDS	PND	96	0.00000	0.00200		MEST83
ISRAEL, LAKE KINNERET	LAK	21	0.00000	0.00000	b	KAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ITALY, PO RIVER	RIV	18	0.00000	0.00000	c, d	GALA81
ITALY, ADIGE RIVER	RIV	18	0.00000	0.00000	c, d	GALA81
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.02000		POLE83
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	[illegible]	c	GREI78A
MALAYSIA, KRIAN DIST, PERAK STATE, TANJONG PIANDANG	PAD	3	1.80000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI KOTA FIELD	PAD	3	0.10000	[illegible]		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, JALAN BHARU SUMP	PND	3	0.90000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK, PARIT TANJONG PIANDANG	CAN	3	0.10000	[illegible]		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI BURONG	CAN	3	0.20000	0.00000		MEIE83
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	[illegible]	c	GREI78B
USA, ATLANTIC OCEAN	OCE	e	0.00000	[illegible]	c, f	JONA76

Table C-1. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
USA, NORTH ATLANTIC OCEAN	OCE	e	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	e	0.00000	0.00000	c, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	e	0.00000	0.00000	c, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, f	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, f	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, f	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, f	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, h	JONA76
USA	e	1	0.00000	0.00000	c, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, f	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, f	JONA76

Table C-1. (Continued)

Location	Water type[a]	No. of samples	Reported values (μg/L)			Reference
			Average	Maximum	Comments	
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, f	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, f	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, g	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	c, i	JONA76
USA, CALIFORNIA	GW	22	0.00000	0.00000	c, j	MADD82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Detection limit = <1 ng/L.

[c] Not detected.

[d] Detection limit = 1 ng/L.

[e] Uncertain.

[f] Depth of 0 m.

[g] Depth of 50 m.

[h] Depth of 500 m.

[i] Depth of 1000 m.

[j] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 65
Number of samples within detection limits: 9
Mean of the highest reported values: 0.37011
Highest of the reported values: 1.80000
Standard deviation: 0.60320
Mean of the natural logarithms: -2.34596
Standard deviation of the natural logarithms: 2.04373

Table C-2. Monitoring data for bayluscide in water.

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	b	GREI78A
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	b	GREI78B

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Not detected.

Statistics:
Number of locations sampled: 2
Number of samples within detection limits: 0

Table C-3. Monitoring data for benthiocarb in water.

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
JAPAN, KITAKYUSHU DISTRICT, EYE RIVER	RIV	5	0.00000	3.05000		SUZU77
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RIV	5	0.00000	10.00000		SUZU77
JAPAN, KITAKYUSHU DISTRICT, OUMA RIVER	RIV	5	0.00000	0.11000		SUZU77
JAPAN, KITAKYUSHU DISTRICT, NISHITANI RIVER	RIV	5	0.00000	2.37000		SUZU77
JAPAN, KITAKYUSHU DISTRICT, HIGASHITANI RIVER	RIV	5	0.00000	2.23000		SUZU77
JAPAN, KITAKYUSHU DISTRICT, CHIKUMA RIVER	RIV	5	0.00000	3.60000		SUZU77
JAPAN, KITAKYUSHU DISTRICT, NUKI RIVER	RIV	5	0.00000	0.00000	b	SUZU77
JAPAN, KITAKYUSHU DISTRICT, MURASAKI RIVER	RIV	5	0.00000	3.28000		SUZU77

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Maximum value = <0.10 µg/L.

Statistics:
Number of locations sampled: 8
Number of samples within detection limits: 7
Mean of the highest reported values: 3.52000
Highest of the reported values: 10.00000
Standard deviation: 3.07923
Mean of the natural logarithms: 0.76345
Standard deviation of the natural logarithms: 1.40102

Table C-4. Monitoring data for total BHC (mixed isomers) in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ANTARCTICA, TOTTUKI POINT	OCE	1	0.00057	0.00000	b	TANA83
ANTARCTICA, LANGHOVDE	OCE	1	0.00021	0.00000	b	TANA83
ANTARCTICA, KITANO-URA COVE	OCE	1	0.00057	0.00000	b	TANA83
ANTARCTICA, NURUME LAKE	LAK	1	0.00033	0.00000	b	TANA83
ANTARCTICA	OCE	1	0.00093	0.00000		TANA83
ANTARCTICA	OCE	1	0.00029	0.00000	c	TANA83
ANTARCTICA	OCE	1	0.00029	0.00000	c	TANA83
ANTARCTIC OCEAN	OCE	1	0.00080	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00041	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00093	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00062	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00029	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00039	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00029	0.00000		TANA82
ARABIAN SEA	OCE	1	0.00130	0.00000		TANA80
ARABIAN SEA	OCE	1	0.00140	0.00000		TANA80
ARABIAN SEA	OCE	1	0.00017	0.00000		TANA80
BAY OF BENGAL	OCE	1	0.00190	0.00000		TANA80
BAY OF BENGAL	OCE	1	0.00110	0.00000		TANA80
BAY OF BENGAL	OCE	1	0.00066	0.00000		TANA80
BERING SEA	OCE	1	0.00420	0.00000		TANA80
BERING SEA	OCE	1	0.00380	0.00000		TANA80
BERING SEA	OCE	1	0.00440	0.00000		TANA80
BERING SEA	OCE	1	0.00430	0.00000		TANA80
BERING SEA	OCE	1	0.00350	0.00000		TANA80
BERING SEA	OCE	1	0.00400	0.00000		TANA80
BERING SEA	OCE	1	0.00320	0.00000		TANA80
EAST CHINA SEA	OCE	1	0.00130	0.00000		TANA80

Table C-4. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
SOUTH CHINA SEA	OCE	1	0.00190	0.00000		TANA80
SOUTH CHINA SEA	OCE	1	0.00340	0.00000		TANA80
INDOCHINA, SOUTH CHINA SEA	OCE	1	0.00700	0.00000		TANA82
SOUTH CHINA SEA	OCE	1	0.00730	0.00000		TANA82
CORAL SEA	OCE	1	0.00120	0.00000		TANA82
CORAL SEA	OCE	1	0.00099	0.00000		TANA82
CORAL SEA	OCE	1	0.00041	0.00000		TANA82
INDONESIA, JAVA SEA	OCE	1	0.00550	0.00000		TANA82
INDIA, SATHIAR RESERVOIR	RES	2	0.00820	0.00850		KANN79
INDIA, SATHIAR RESERVOIR	RES	12	0.00000	0.01000		KANN79
INDIA, SATHIAR RESERVOIR	RES	1	0.00950	0.00000		KANN79
INDIA, MYSORE DISTRICT	d	13	0.00000	2360.00000		RAJU82
INDIAN OCEAN, JAVA TRENCH	OCE	1	0.00310	0.00000		TANA82
INDIAN OCEAN, S. OF INDONESIA	OCE	1	0.00360	0.00000		TANA82
INDIAN OCEAN	OCE	1	0.00170	0.00000		TANA82
INDIAN OCEAN, OFF W. AUSTRALIA	OCE	1	0.00100	0.00000		TANA82
INDIAN OCEAN, S. OF AUSTRALIA	OCE	1	0.00027	0.00000		TANA82
JAPAN, KITAKYUSHU DISTRICT, TONDA RESERVOIR	SW	10	0.07000	0.50000		YAMA80B
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RIV	10	0.02000	0.65000		YAMA80B
JAPAN, RYUKU RETTO, N. PACIFIC OCEAN	OCE	1	0.00330	0.00000		TANA82
JAPAN, NAMPO, SHOTO/IZU TRENCH, N. PACIFIC OCEAN	OCE	1	0.00120	0.00000		TANA82
JAPAN, NAMPO, SHOTO, N. PACIFIC OCEAN	OCE	1	0.00099	0.00000		TANA82
KENYA, NZOIA RIVER CATCHMENT	RIV	11	0.00000	0.00000	e	KALL77
KENYA, NZOIA RIVER CATCHMENT	RIV	13	0.00000	0.00000	e	KALL77
KENYA, LAKE NAKURU	LAK	d	0.00000	0.00000	f	KALL77
KENYA, LAKE ELEMENTEITA	LAK	d	0.00000	0.00000	f	KALL77
KENYA, LAKE NAIVASHA	LAK	d	0.00000	0.00000	f	KALL77
KENYA, MALEWA RIVER	RIV	d	0.00000	0.00000	f	KALL77
KENYA, GILGIL RIVER	RIV	d	0.00000	0.00000	f	KALL77

Table C-4. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
PACIFIC OCEAN, MELANESIA	OCE	1	0.00077	0.00000		TANA82
N. PACIFIC OCEAN, EAST CAROLINE BASIN	OCE	1	0.00052	0.00000		TANA82
N. PACIFIC OCEAN, MARIANA TRENCH	OCE	1	0.00053	0.00000		TANA82
N. PACIFIC OCEAN, AGRIHAN ISLAND	OCE	1	0.00110	0.00000		TANA82
N. PACIFIC OCEAN	OCE	1	0.00052	0.00000		TANA82
NORTHWEST PACIFIC OCEAN	OCE	1	0.01130	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.02260	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.01240	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00490	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00830	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00830	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00810	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00850	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00130	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00190	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00140	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00140	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00100	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00085	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00380	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00370	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00550	0.00000		TANA80
PACIFIC OCEAN	OCE	1	0.01050	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.01420	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00620	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00630	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00820	0.00000		TANA80
TASMAN SEA	OCE	1	0.00032	0.00000		TANA82

Table C-4. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
USA, ALABAMA, HARTSELLE, FLINT CREEK	CRK	13	0.00700	1.00400		NICH64
USA, CALIFORNIA	GW	22	0.00000	0.00000	g, h	MADD82

a Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.
b Under ice.
c Outer margin of pack ice.
d Uncertain.
e Average detected = <0.13 ppb.
f Average detected = <0.04 ppb.
g Not detected.
h Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 87
Number of samples within detection limits: 79
Mean of the highest reported values: 29.90407
Highest of the reported values: 2360.00000
Standard deviation: 265.51729
Mean of the natural logarithms: -5.89828
Standard deviation of the natural logarithms: 2.27241

Table C-5. Monitoring data for alpha-BHC in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ANTARCTIC OCEAN	OCE	1	0.00007	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00004	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00007	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00010	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00007	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00007	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00009	0.00000		TANA82
ARGENTINA, PARANA RIVER, 600 KM ABOVE THE MOUTH	RIV	14	0.00900	0.03300		LENA84
ARGENTINA, SALADO RIVER	RIV	6	0.00800	0.00000		LENA84
ARGENTINA, PARQUE GENERAL, BELGRANO LAKE	LAK	14	0.01000	0.00000		LENA84
ARGENTINA, SETUBAL LAKE	LAK	14	0.01100	0.00000		LENA84
BELGIUM, EYSDEN, RIVER MEUSE	RIV	b	0.00000	0.01000		WEGM78
INDOCHINA, SOUTH CHINA SEA	OCE	1	0.00290	0.00000		TANA82
SOUTH CHINA SEA	OCE	1	0.00340	0.00000		TANA82
CORAL SEA	OCE	1	0.00027	0.00000		TANA82
CORAL SEA	OCE	1	0.00016	0.00000		TANA82
CORAL SEA	OCE	1	0.00015	0.00000		TANA82
EGYPT, MAHMOUDIEH CANAL	SW	1	0.39000	0.00000		ELSE79
EGYPT, EL-SOYOUF WATER TREATMENT PLANT	SW	1	0.00000	0.00000	c	ELSE79
EGYPT, MAHMOUDIEH	TAP	1	0.10000	0.00000		ELSE79
EGYPT, ABEES	WST	1	0.19000	0.00000		ELSE79
FRANCE, MEDITERANNEAN SEA, 10 MI. FROM COAST	OCE	29	0.00500	0.04400		MEST83

Table C-5. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FRANCE, MEDITERANNEAN SEA, LITTORAL PONDS	PND	53	0.00820	0.03000		MEST83
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	5	0.00000	1.50000		HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	8	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.02500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	4	0.12500	0.90500		HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	8	0.15500	2.40000		HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.11500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.11000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.55000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	8	0.00000	0.05000		HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.04000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.02000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.29500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.02500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.17000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	c	HERZ72

Table C-5. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.04000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.17000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.09500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	8	0.00000	0.19000		HERZ72
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	8	0.13500	1.70000		HERZ72
GERMANY, BELLINGEN, RHINE RIVER	RIV	b	2.10000	0.00000		WEGM78
GERMANY, ARTZENHEIM, RHINE RIVER	RIV	b	2.70000	0.00000		WEGM78
GERMANY/FRANCE, STRASBOURG, RHINE RIVER	RIV	b	0.15000	0.00000		WEGM78
GERMANY, KARLSRUHE, RHINE RIVER	RIV	b	1.10000	0.00000		WEGM78
GERMANY, LUDWIGSHAFEN, RHINE RIVER	RIV	b	0.86000	0.00000		WEGM78
GERMANY, MAINZ, RHINE RIVER	RIV	b	0.60000	0.00000		WEGM78
GERMANY, LEVERKUSEN, RHINE RIVER	RIV	b	0.33000	0.00000		WEGM78
GERMANY, DUISBURG, RHINE RIVER	RIV	b	0.27000	0.00000		WEGM78
INDONESIA, JEPARA	BRK	2	0.12000	0.14000		PURN77
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	5	0.31000	0.50000		PURN77
INDONESIA, JAVA SEA	OCE	1	0.00130	0.00000		TANA82
INDIA, MYSORE DISTRICT	b	13	0.00000	830.00000		RAJU82
INDIAN OCEAN, JAVA TRENCH	OCE	1	0.00048	0.00000		TANA82
INDIAN OCEAN, S. OF INDONESIA	OCE	1	0.00056	0.00000		TANA82
INDIAN OCEAN	OCE	1	0.00012	0.00000		TANA82
INDIAN OCEAN, OFF W. AUSTRALIA	OCE	1	0.00002	0.00000		TANA82
INDIAN OCEAN, S. OF AUSTRALIA	OCE	1	0.00003	0.00000		TANA82
IRELAND, LOUGH VEIGH	RIV	b	0.00300	0.00000		HARP80
NORTHERN IRELAND, LOUGH NERIGH, BLACKWATER RIVER	RIV	30	0.00900	0.00000		HARP77

Table C-5. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	3	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00410	0.00000		LAHA74
ITALY, PO RIVER	RIV	18	0.00300	0.03700	d	GALA81
ITALY, ADIGE RIVER	RIV	18	0.00100	0.02400	d	GALA81
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.02000	1.00000		POLE83
JAPAN, KITAKYUSHU DISTRICT, HIGASHITANI RIVER	RIV	1	0.42000	0.00000		SUZU74
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RIV	1	0.50000	0.00000		SUZU74
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RES	1	0.05000	0.00000		SUZU74
JAPAN, HINO, TAMAGAWA RIVER	RIV	7	0.00500	0.38800		OCHI76
JAPAN, TAMAGAWA RIVER, NORBORITO	RIV	7	0.01600	0.48700		OCHI76
JAPAN, MARUKO, TAMAGAWA RIVER	RIV	7	0.01400	0.57700		OCHI76
JAPAN, RYUKU, RETTO, N. PACIFIC OCEAN	OCE	1	0.00180	0.00000		TANA82
JAPAN, NAMPO SHOTO/IZU TRENCH, N. PACIFIC OCEAN	OCE	1	0.00064	0.00000		TANA82
JAPAN, NAMPO SHOTO, N. PACIFIC OCEAN	OCE	1	0.00071	0.00000		TANA82
NETHERLANDS/GERMANY,LOBITH, RHINE RIVER	RIV	b	0.24000	0.00000		WEGM78
NETHERLANDS, ROTTERDAM, RHINE RIVER	RIV	b	0.23000	0.00000		WEGM78
NETHERLANDS/GERMANY, LOBITH, RHINE RIVER	RIV	b	0.02000	0.22000		WEGM78

Table C-5. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
NORTHERN IRELAND, LOUGH NERIGH, MAIN RIVER	RIV	30	0.01200	0.00000		HARP77
NORTHERN IRELAND, LOUGH NERIGH, MOYOLA RIVER	RIV	30	0.00600	0.00000		HARP77
NORTHERN IRELAND, LOUGH NERIGH, SIX MILE WATER	RIV	30	0.02600	0.00000		HARP77
NORTHERN IRELAND, LOUGH NERIGH, UPPER BAIN RIVER	RIV	30	0.01100	0.00000		HARP77
NORTHERN IRELAND, LOUGH NERIGH, BALLINDERRY RIVER	RIV	30	0.00600	0.00000		HARP77
ISRAEL, LAKE KINNERET	LAK	21	0.00006	0.02260	d	HARP74
ISRAEL, LAKE KINNERET WATERSHED, DAN RIVER AT FOUNT	RIV	1	0.00000	0.00000	c, d	KAHA74
ISRAEL, JORDAN RIVER	RIV	6	0.00070	0.00240	d	KAHA74
ISRAEL, NESHUSHIM RIVER	RIV	1	0.00060	0.00000	d	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00060	d	KAHA74
ISRAEL, JORDAN RIVER (LOWER)	RIV	1	0.02360	0.00000	d	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.00930	0.00000	d	KAHA74
ISRAEL, BEL-NOTAFA RESERVOIR	RES	1	0.00470	0.00000	d	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00100	0.00000	d	KAHA74
ISRAEL, KISHON RESERVOIR, NORTH	RES	1	0.00180	0.00000	d	KAHA74
ISRAEL, KISHON RESERVOIR, SOUTH	RES	3	0.00350	0.04200	d	KAHA74
ISRAEL, GEVAT RESERVOIR	RES	3	0.00360	0.00920	d	KAHA74
ISRAEL, GEVAT RESERVOIR (ENTRANCE)	RES	4	0.00130	0.00240	d	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00430	0.00000	d	KAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	6	0.00000	0.00000	c	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	c	LAHA74

Table C-5. (Continued)

Location	Water type[a]	No. of samples[c]	Reported values (μg/L) Average	Maximum	Comments	Reference
NORWAY, STRYKEN, RIVER NITELVA	RIV	b	0.80000	0.00000		SCHO81
NORWAY, KJELLERHOLEN, RIVER NITELVA	RIV	b	1.20000	0.00000		SCHO81
NORWAY, SAGDALVELVA, RIVER NITELVA	RIV	b	0.60000	0.00000		SCHO81
NORWAY, LEIRALVELVA, RIVER NITELVA	RIV	b	1.00000	0.00000		SCHO81
NORWAY, LILLESTROMA, LAKE OYEREN	LAK	b	2.90000	0.00000		SCHO81
PACIFIC OCEAN, MELANESIA	OCE	1	0.00026	0.00000		TANA82
N. PACIFIC OCEAN, EAST CAROLINE BASIN	OCE	1	0.00022	0.00000		TANA82
N. PACIFIC OCEAN, MARIANA TRENCH	OCE	1	0.00024	0.00000		TANA82
N. PACIFIC OCEAN, AGRIHAN ISLAND	OCE	1	0.00032	0.00000		TANA82
N. PACIFIC OCEAN	OCE	1	0.00033	0.00000		TANA82
SWITZERLAND, RHEINFELDEN, RHINE RIVER	RIV	b	0.02000	0.00000		WEGM78
SWITZERLAND, BASEL, RHINE RIVER	RIV	b	1.20000	0.00000		WEGM78
TASMAN SEA	OCE	1	0.00012	0.00000		TANA82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Uncertain.

[c] Not detected.

[d] Detection limit = 1 ng/L.

Statistics:
Number of locations sampled: 129
Number of samples within detection limits: 107
Mean of the highest reported values: 8.03823
Highest of the reported values: 830.00000
Standard deviation: 80.21368
Mean of the natural logarithms: -4.00432
Standard deviation of the natural logarithms: 3.37547

Table C-6. Monitoring data for beta-BHC in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ANTARCTIC OCEAN	OCE	1	0.00006	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00003	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00004	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00003	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00002	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
INDOCHINA, SOUTH CHINA SEA	OCE	1	0.00080	0.00000		TANA82
SOUTH CHINA SEA	OCE	1	0.00100	0.00000		TANA82
CORAL SEA	OCE	1	0.00001	0.00000		TANA82
CORAL SEA	OCE	1	0.00002	0.00000		TANA82
CORAL SEA	OCE	1	0.00002	0.00000		TANA82
GERMANY, BELLINGEN, RHINE RIVER	RIV	b	0.22000	0.00000		WEGM78
GERMANY, ARTZENHEIM, RHINE RIVER	RIV	b	0.30000	0.00000		WEGM78
GERMANY/FRANCE, STRASBOURG, RHINE RIVER	RIV	b	0.09000	0.00000		WEGM78
GERMANY, KARLSRUHE, RHINE RIVER	RIV	b	0.13000	0.00000		WEGM78
GERMANY, LUDWIGSHAFEN, RHINE RIVER	RIV	b	0.10000	0.00000		WEGM78
GERMANY, MAINZ, RHINE RIVER	RIV	b	0.08000	0.00000		WEGM78
GERMANY, LEVERKUSEN, RHINE RIVER	RIV	b	0.05000	0.00000		WEGM78
GERMANY, DUISBURG, RHINE RIVER	RIV	b	0.03000	0.00000		WEGM78
INDONESIA, JAVA SEA	OCE	1	0.00054	0.00000		TANA82
INDIA, MYSORE DISTRICT	b	13	0.00000	830.00000		RAJU82
INDIAN OCEAN, JAVA TRENCH	OCE	1	0.00014	0.00000		TANA82
INDIAN OCEAN, S. OF INDONESIA	OCE	1	0.00016	0.00000		TANA82

Table C-6. (Continued)

Location	Water type[a]	No. of samples	Reported values (μg/L) Average	Maximum	Comments	Reference
INDIAN OCEAN	OCE	1	0.00011	0.00000		TANA82
INDIAN OCEAN, OFF W. AUSTRALIA	OCE	1	0.00007	0.00000		TANA82
INDIAN OCEAN, S. OF AUSTRALIA	OCE	1	0.00004	0.00000		TANA82
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.03000		POLE83
JAPAN, KITAKYUSHU DISTRICT, TONDA RESERVOIR	SW	10	0.02000	0.20000		YAMA80B
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RIV	10	0.01000	0.20000		YAMA80B
JAPAN, KITAKYUSHU DISTRICT, HIGASHITANI RIVER	RIV	1	0.05000	0.00000		SUZU74
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RIV	1	0.04000	0.00000		SUZU74
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RES	1	0.04000	0.00000		SUZU74
JAPAN, RYUKU RETTO, N. PACIFIC OCEAN	OCE	1	0.00011	0.00000		TANA82
JAPAN, NAMPO SHOTO/IZU TRENCH, N. PACIFIC OCEAN	OCE	1	0.00030	0.00000		TANA82
JAPAN, NAMPO SHOTO, N. PACIFIC OCEAN	OCE	1	0.00017	0.00000		TANA82
MALAYSIA, KRIAN DIST, PERAK STATE, TANJONG PIANDANG	PAD	3	0.90000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI KOTA FIELD	PAD	3	0.10000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, JALAN BHARU SUMP	PND	3	0.10000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK, PARIT TANJONG PIANDANG	CAN	3	0.20000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI BURONG	CAN	3	0.30000	0.00000		MEIE83
NETHERLANDS/GERMANY, LOBITH, RHINE RIVER	RIV	b	0.05000	0.00000		WEGM78
NETHERLANDS, ROTTERDAM, RHINE RIVER	RIV	b	0.00000	0.00000	c	WEGM78
PACIFIC OCEAN, MELANESIA	OCE	1	0.00006	0.00000		TANA82
N. PACIFIC OCEAN, EAST CAROLINE BASIN	OCE	1	0.00003	0.00000		TANA82
N. PACIFIC OCEAN, MARIANA TRENCH	OCE	1	0.00008	0.00000		TANA82

Table C-6. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
N. PACIFIC OCEAN, AGRIHAN ISLAND	OCE	1	0.00015	0.00000		TANA82
N. PACIFIC OCEAN	OCE	1	0.00003	0.00000		TANA82
SWITZERLAND, RHEINFELDEN, RHINE RIVER	RIV	b	0.02000	0.00000		WEGM78
SWITZERLAND, BASEL, RHINE RIVER	RIV	b	0.15000	0.00000		WEGM78
TASMAN SEA	OCE	1	0.00001	0.00000		TANA82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Uncertain.

[c] Not detected.

Statistics:
Number of locations sampled: 51
Number of samples within detection limits: 50
Mean of the highest reported values: 16.66768
Highest of the reported values: 830.00000
Standard deviation: 117.37005
Mean of the natural logarithms: -6.10491
Standard deviation of the natural logarithms: 4.25332

Table C-7. Monitoring data for gamma-BHC (Lindane) in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ANTARCTIC OCEAN	OCE	1	0.00067	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00035	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00081	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00049	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00021	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00030	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00020	0.00000		TANA82
ARGENTINA, PARANA RIVER, 600 KM ABOVE THE MOUTH	RIV	14	0.00900	0.02500	b	LENA84
ARGENTINA, SALADO RIVER	RIV	6	0.05800	0.00000		LENA84
ARGENTINA, PARQUE GENERAL, BELGRANO LAKE	LAK	14	0.00800	0.00000		LENA84
ARGENTINA, SETUBAL LAKE	LAK	14	0.00800	0.00000		LENA84
BELGIUM, EYSDEN, RIVER MEUSE	RIV	c	0.01000	0.03000		WEGM78
INDOCHINA, SOUTH CHINA SEA	OCE	1	0.00330	0.00000		TANA82
SOUTH CHINA SEA	OCE	1	0.00290	0.00000		TANA82
CORAL SEA	OCE	1	0.00094	0.00000		TANA82
CORAL SEA	OCE	1	0.00072	0.00000		TANA82
CORAL SEA	OCE	1	0.00024	0.00000		TANA82
EGYPT, EL-SALAAM	GW	1	1.08000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	1.10000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.02000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.25000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83

Table C-7. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	1.08000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	1.17000	0.00000		ELZA83
EGYPT, LAKE MARIUT	LAK	12	2.09000	0.00000		SAAD82
EGYPT, MAHMOUDIEH CANAL	SW	1	0.34000	0.00000		ELSE79
EGYPT, EL-SOYOUF WATER TREATMENT PLANT	SW	1	0.19000	0.00000		ELSE79
EGYPT, MAHMOUDIEH	TAP	1	0.29000	0.00000		ELSE79
EGYPT, ABEES	WST	1	0.63000	0.00000		ELSE79
FRANCE, MEDITERRANEAN SEA, 10 MI. FROM COAST	OCE	55	0.01000	0.29500		MEST83
FRANCE, MEDITERRANEAN SEA, LITTORAL PONDS	PND	96	0.00880	0.02900		MEST83
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.12500	0.43000		HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.14500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00500	0.06000		HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.04500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.10500	0.24500		HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.05000	0.53500		HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.15500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.26000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.13000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00500	0.04500		HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.02500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.03000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.04000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.01500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	d	HERZ72

Table C-7. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.61500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.02000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.06400	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.03000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.02500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.14000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.05500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00500	0.08000		HERZ72
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.06000	7.10000		HERZ72
GERMANY, BELLINGEN, RHINE RIVER	RIV	c	1.00000	0.00000		WEGM78
GERMANY, ARTZENHEIM, RHINE RIVER	RIV	c	1.10000	0.00000		WEGM73
GERMANY/FRANCE, STRASBOURG, RHINE RIVER	RIV	c	0.64000	0.00000		WEGM78
GERMANY, KARLSRUHE, RHINE RIVER	RIV	c	0.42000	0.00000		WEGM78
GERMANY, LUDWIGSHAFEN, RHINE RIVER	RIV	c	0.33000	0.00000		WEGM78
GERMANY, MAINZ, RHINE RIVER	RIV	c	0.29000	0.00000		WEGM78
GERMANY, LEVERKUSEN, RHINE RIVER	RIV	c	0.15000	0.00000		WEGM78
GERMANY, DUISBURG, RHINE RIVER	RIV	c	0.11000	0.00000		WEGM78
INDONESIA, JEPARA	BRK	2	0.12000	0.22000		PURN77
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	3	0.20000	0.30000		PURN77
INDONESIA, JAVA SEA	OCE	1	0.00370	0.00000		TANA82
INDIA, CALCUTTA	GW	4	0.00000	0.00000	d	MUKH80
INDIA, CALCUTTA, GANGES RIVER	RIV	2	0.00000	0.00000	d	MUKH80
INDIA, CALCUTTA	SW	2	0.00000	0.00000	d	MUKH80
INDIA, CALCUTTA	PND	2	0.00000	0.00000	d	MUKH80

Table C-7. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
INDIA, MYSORE DISTRICT	c	13	0.00000	1200.00000		RAJU82
INDIAN OCEAN, JAVA TRENCH	OCE	1	0.00250	0.00000		TANA82
INDIAN OCEAN, S. OF INDONESIA	OCE	1	0.00290	0.00000		TANA82
INDIAN OCEAN	OCE	1	0.00150	0.00000		TANA82
INDIAN OCEAN, OFF W. AUSTRALIA	OCE	1	0.00093	0.00000		TANA82
INDIAN OCEAN, S. OF AUSTRALIA	OCE	1	0.00020	0.00000		TANA82
IRELAND, LOUGH VEIGH	RIV	c	0.00200	0.00000		HARP80
NORTHERN IRELAND, LOUGH NERIGH, BLACKWATER RIVER	RIV	30	0.01100	0.00000		HARP77
NORTHERN IRELAND, LOUGH NERIGH, MAIN RIVER	RIV	30	0.02000	0.00000		HARP77
NORTHERN IRELAND, LOUGH NERIGH, MOYOLA RIVER	RIV	30	0.01200	0.00000		HARP77
NORTHERN IRELAND, LOUGH NERIGH, SIX MILE WATER	RIV	30	0.01600	0.00000		HARP77
NORTHERN IRELAND, LOUGH NERIGH, UPPER BAIN RIVER	RIV	30	0.02300	0.00000		HARP77
NORTHERN IRELAND, LOUGH NERIGH, BALLINDERRY RIVER	RIV	30	0.01000	0.00000		HARP77
IRAN	PAD	80	0.00000	1920.00000		TEIM79
ISRAEL, LAKE KINNERET	LAK	21	0.00008	0.02210	e	KAHA74
ISRAEL, LAKE KINNERET WATERSHED, DAN RIVER AT FOUNT	RIV	1	0.00000	0.00000	d, e	KAHA74
ISRAEL, JORDAN RIVER	RIV	6	0.00030	0.00520	e	KAHA74
ISRAEL, NESHUSHIM RIVER	RIV	1	0.00010	0.00000	e	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00061	e	KAHA74
ISRAEL, JORDAN RIVER (LOWER)	RIV	1	0.11900	0.00000	e	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.01420	0.00000	e	KAHA74
ISRAEL, BEL-NOTAFA RESERVOIR	RES	1	0.00270	0.00000	e	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00210	0.00000	e	KAHA74
ISREAL, KISHON RESERVOIR, NORTH	RES	1	0.00170	0.00000	e	KAHA74
ISRAEL, KISHON RESERVOIR, SOUTH	RES	3	0.00300	0.02100	e	KAHA74
ISRAEL, GEVAT RESERVOIR	RES	3	0.00190	0.00630	e	KAHA74
ISRAEL, GEVAT RESERVOIR ENTRANCE	RES	4	0.00040	0.00440	e	KAHA74

Table C-7. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00260	0.00000	e	KAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	f	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	f	LAHA74
ISRAEL, COASTAL AQUIFER	GW	6	0.00240	0.00760		LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00054	0.00000		LAHA74
ISRAEL, COASTAL AQUIFER	GW	3	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.01490	0.00000		LAHA74
ITALY, PO RIVER	RIV	18	0.00200	0.01300	g	GALA81
ITALY, ADIGE RIVER	RIV	18	0.00100	0.00700	g	GALA81
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.02000		POLE83
JAPAN, KITAKYUSHU DISTRICT, TONDA RESERVOIR	SW	10	0.00000	0.10000		YAMA80B
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RIV	10	0.00000	0.11000		YAMA80B
JAPAN, HINO, TAMAGAWA RIVER	RIV	7	0.00500	0.23400		OCHI76
JAPAN, NORBORITO, TAMAGAWA RIVER	RIV	7	0.01600	0.14500		OCHI76
JAPAN, MARUKO, TAMAGAWA RIVER	RIV	7	0.02400	0.17900		OCHI76
JAPAN, RYUKU RETTO, N. PACIFIC OCEAN	OCE	1	0.00140	0.00000		TANA82
JAPAN, NAMPO SHOTO/IZU TRENCH, N. PACIFIC OCEAN	OCE	1	0.00025	0.00000		TANA82
JAPAN, NAMPO SHOTO, N. PACIFIC OCEAN	OCE	1	0.00011	0.00000		TANA82
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	d	GREI78A
MALAYSIA, KRIAN DIST, PERAK STATE, TANJONG PIANDANG	PAD	3	0.60000	0.00000		MEIE83

Table C-7. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI KOTA FIELD	PAD	3	0.10000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, JALAN BHARU SUMP	PND	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK, PARIT TANJONG PIANDANG	CAN	3	0.10000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI BURONG	CAN	3	0.10000	0.00000		MEIE83
NETHERLANDS/GERMANY, LOBITH, RHINE RIVER	RIV	c	0.13000	0.00000		WEGM78
NETHERLANDS, ROTTERDAM, RHINE RIVER	RIV	c	0.10000	0.00000		WEGM78
NETHERLANDS/GERMANY, LOBITH, RHINE RIVER	RIV	c	0.02000	0.18000		WEGM78
NORWAY, STRYKEN, RIVER NITELVA	RIV	c	1.40000	0.00000		SCHO81
NORWAY, KJELLERHOLEN, RIVER NITELVA	RIV	c	1.40000	0.00000		SCHO81
NORWAY, SAGDALVELVA, RIVER NITELVA	RIV	c	1.60000	0.00000		SCHO81
NORWAY, LEIRALVELVA, RIVER NITELVA	RIV	c	0.90000	0.00000		SCHO81
NORWAY, LILLESTROMA, LAKE OYEREN	LAK	c	4.00000	0.00000		SCHO81
PACIFIC OCEAN, MELANESIA	OCE	1	0.00045	0.00000		TANA82
N. PACIFIC OCEAN, EAST CAROLINE BASIN	OCE	1	0.00027	0.00000		TANA82
N. PACIFIC OCEAN, MARIANA TRENCH	OCE	1	0.00021	0.00000		TANA82
N. PACIFIC OCEAN, AGRIHAN ISLAND	OCE	1	0.00059	0.00000		TANA82
N. PACIFIC OCEAN	OCE	1	0.00016	0.00000		TANA82
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	d	GREI78B
SWITZERLAND, RHEINFELDEN, RHINE RIVER	RIV	c	0.02000	0.00000		WEGM78
SWITZERLAND, BASEL, RHINE RIVER	RIV	c	0.47000	0.00000		WEGM78
TASMAN SEA	OCE	1	0.00019	0.00000		TANA82
USA, ATLANTIC OCEAN	OCE	c	0.00000	0.00000	h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	c	0.00000	0.00000	i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	c	0.00000	0.00000	j	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	c	0.00000	0.00000	k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, h	JONA76

Table C-7. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, j	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, j	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, j	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, j	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, j	JONA76
UNITED STATES	c	1	0.00000	0.00000	d, k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, j	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, j	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, k	JONA76

Table C-7. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, j	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, h	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, i	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, j	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, k	JONA76

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.
[b] Standard deviation = 5.10 ng/L.
[c] Uncertain.
[d] Not detected.
[e] Detection limit = <1 ng/L.
[f] Trace amount detected.
[g] Detection limit = 1 ng/L.
[h] Depth = 0 m.
[i] Depth = 50 m.
[j] Depth = 500 m.
[k] Depth = 1000 m.

Statistics:
Number of locations sampled: 193
Number of samples within detection limits: 125
Mean of the highest reported values: 25.24636
Highest of the reported values: 1920.00000
Standard deviation: 201.74274
Mean of the natural logarithms: -3.52994
Standard deviation of the natural logarithms: 3.07994

Table C-8. Monitoring data for captan in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
TAIWAN, TEH-CHI WATERSHED	RIV	69	0.00000	0.00000	b	WONG83
USA, CALIFORNIA	GW	22	0.00000	0.00000	b, c	MADO82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Not detected.

[c] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 2
Number of samples within detection limits: 0

Table C-9. Monitoring data for carbaryl in water.

Location	Water type[a]	No. of samples	Reported values (μg/L) Average	Maximum	Comments	Reference
EGYPT, GIZA	DRN	0	0.00000	0.00000	b	OSMA80A
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	c	0.40000	0.00000		GREV72
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	c	0.20000	0.00000		GREV72

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Not quantified.

[c] Uncertain.

Statistics:
Number of locations sampled: 3
Number of samples within detection limits: 2
Mean of the highest reported values: 0.30000
Highest of the reported values: 0.40000
Standard deviation: 0.14142
Mean of the natural logarithms: -1.26280
Standard deviation of the natural logarithms: 0.49022

Table C-10. Monitoring data for chlordane[a] in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	c	GREI78A
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	c	GREI78B
USA, CALIFORNIA	GW	22	0.00000	0.00000	c, d	MAD082

[a] Isomers not specified by authors.
[b] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.
[c] Not detected.
[d] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 3
Number of samples within detection limits: 0

Table C-11. Monitoring data for cis-chlordane in water.

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	d	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.00000	e	POLE83

Table C-11. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
MALAYSIA, KRIAN DIST, PERAK STATE, TANJONG PIANDANG	PAD	3	0.00000	0.00000	e	MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI KOTA FIELD	PAD	3	0.10000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, JALAN BHARU SUMP	PND	3	0.00000	0.00000	e	MEIE83
MALAYSIA, KRIAN DIST, PERAK, PARIT, TANJONG PIANDANG	CAN	3	0.10000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI BURONG	CAN	3	0.10000	0.00000		MEIE83

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Depth = 30 cm.

[c] Depth = 150 µm.

[d] Uncertain.

[e] Not detected.

Statistics:
Number of locations sampled: 22
Number of samples within detection limits: 3
Mean of the highest reported values: 0.10000
Highest of the reported values: 0.100000
Standard deviation: 0.00000
Mean of the natural logarithms: -2.30258
Standard deviation of the natural logarithms: 0.00000

Table C-12. Monitoring data for trans-chlordane in water.

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	c	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	b	BIDL73
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.00000	d	POLE83

Table C-12. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
MALAYSIA, KRIAN DIST, PERAK, PARIT, TANJONG PIANDANG	CAN	3	0.50000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, TANJONG PIANDANG	PAD	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI KOTA FIELD	PAD	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, JALAN BHARU SUMP	PND	3	0.30000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI BURONG	CAN	3	0.10000	0.00000		MEIE83

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Depth = 30 cm.

[c] Depth = 150 µm.

[d] Not detected.

Statistics:
Number of locations sampled: 22
Number of samples within detection limits: 3
Mean of the highest reported values: 0.30000
Highest of the reported values: 0.50000
Standard deviation: 0.20000
Mean of the natural logarithms: -1.39990
Standard deviation of the natural logarithms: 0.82242

Table C-13. Monitoring data for CNP in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
JAPAN, KITAKYUSHU DISTRICT, EYE RIVER	RIV	10	0.00000	0.33000		SUZU78
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RIV	10	0.00000	0.50000		SUZU78
JAPAN, KITAKYUSHU DISTRICT, OUMA RIVER	RIV	10	0.00000	2.00000		SUZU78
JAPAN, KITAKYUSHU DISTRICT, NISHITANI RIVER	RIV	10	0.00000	0.17000		SUZU78
JAPAN, KITAKYUSHU DISTRICT, HIGASHITANI RIVER	RIV	10	0.00000	16.67000		SUZU78
JAPAN, KITAKYUSHU DISTRICT, CHIKUMA RIVER	RIV	10	0.00000	0.43000		SUZU78
JAPAN, KITAKYUSHU DISTRICT, MUKI RIVER	RIV	10	0.00000	0.59000		SUZU78
JAPAN, KITAKYUSHU DISTRICT, MURASAKI RIVER	RIV	10	0.00000	0.83000		SUZU78
JAPAN, TOKYO BAY	OCE	55	0.00000	0.00190		YAMA81

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

Statistics:
Number of locations sampled: 9
Number of samples within detection limits: 9
Mean of the highest reported values: 2.39132
Highest of the reported values: 16.67000
Standard deviation: 5.38555
Mean of the natural logarithms: -0.87671
Standard deviation of the natural logarithms: 2.41377

Table C-14. Monitoring data for 2-4,D in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
INDONESIA, JEPARA	BRK	1	0.01000	0.00000		PURN77
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	3	0.08000	0.22000		PURN77

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

Statistics:
Number of locations sampled: 2
Number of samples within detection limits: 2
Mean of the highest reported values: 0.11500
Highest of the reported values: 0.22000
Standard deviation: 0.14849
Mean of the natural logarithms: -3.05964
Standard deviation of the natural logarithms: 2.18568

Table C-15. Monitoring data for p,p'-DDD in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
CANADA, HAMILTON, LAKE ONTARIO	LAK	b	0.00250	0.00000	c	WALL79
CANADA, TORONTO, LAKE ONTARIO	LAK	b	0.00160	0.00000		WALL79
CANADA/USA, NIAGARA RIVER	RIV	b	0.00090	0.00000		WALL79
CANADA, COLBURG, LAKE ONTARIO	LAK	b	0.00450	0.00000		WALL79
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00090	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	3.20000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.08000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.14000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.12000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72

Table C-15. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00000	0.00000	d	HERZ72
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.00000	0.83000		HERZ72
INDONESIA, JEPARA	BRK	2	0.00000	0.00000	e	PURN77
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	2	0.00000	0.15000		PURN77
ISRAEL, LAKE KINNERET	LAK	21	0.00000	0.00000	f	KAHA74
ISRAEL, LAKE KINNERET WATERSHED, DAN RIVER AT FOUNT	RIV	1	0.00000	0.00000	d, f	KAHA74
ISRAEL, JORDAN RIVER	RIV	5	0.00000	0.00130	f	KAHA74
ISRAEL, NESHUSHIM RIVER	RIV	1	0.00000	0.00000	d, f	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	d, f	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	d, f	KAHA74
ISRAEL, LOWER JORDAN RIVER	RIV	1	0.00000	0.00000	d, f	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.00000	0.00000	d, f	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00000	0.00000	d, f	KAHA74

Table C-15. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ISRAEL, KISHON RESERVOIR, NORTH	RES	1	0.00000	0.00000	d, f	KAHA74
ISRAEL, KISHON RESERVOIR, SOUTH	RES	2	0.00000	0.00110	f	KAHA74
ISRAEL, GEVAT RESERVOIR	RES	1	0.00040	0.00000	f	KAHA74
ISRAEL, GEVAT RESERVOIR (ENTRANCE)	RES	4	0.00000	0.00430	f	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00000	0.00000	d, f	KAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ITALY, PO RIVER	RIV	18	0.00000	0.00000	g	GALA81
ITALY, ADIGE RIVER	RIV	18	0.00000	0.00000	g	GALA81
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.05000		POLE83
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	h	GREI78A
MALAYSIA, KRIAN DIST, PERAK STATE, TANJONG PIANDANG	PAD	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI KOTA FIELD	PAD	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, JALAN BHARU SUMP	PND	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK, PARIT TANJONG PIANDANG	CAN	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI BURONG	CAN	3	0.00000	0.00000	d	MEIE83
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	h	GREI78B
REP. S. AFRICA, TRANSVAAL, HARTBEESPOORT DAM	LAK	1	0.10000	0.00000		GREI77

Table C-15. (Continued)

Location	Water type[a]	No. of samples	Reported values (μg/L) Average	Maximum	Comments	Reference
REP. S. AFRICA, CAPE PROVINCE, VOELVLEI DAM	LAK	1	0.00000	0.00000	h	GREI77
TURKEY, LOWER SEYHAN DELTA	DRN	1	270.00000	0.00000	i	CINA82
TURKEY, LOWER SEYHAN DELTA	DRN	3	30.00000	40.00000	j	CINA82
TURKEY, LOWER SEYHAN DELTA	DRN	4	20.00000	260.00000	k	CINA82
TURKEY, LOWER SEYHAN DELTA	DRN	3	820.00000	1060.00000	l	CINA82
TURKEY, LOWER SEYHAN DELTA	DRN	4	30.00000	940.00000	m	CINA82
USA, ATLANTIC OCEAN	OCE	b	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	b	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	b	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	b	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NEW YORK, OLCOTT, LAKE ONTARIO	LAK	b	0.00710	0.00000		WALL79
USA, NEW YORK, ROCHESTER, LAKE ONTARIO	LAK	b	0.00000	0.00000	r	WALL79
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA/CANADA, LAKE ONTARIO	LAK	b	0.00000	0.00000	r	WALL79
USA, NEW YORK, OSWEGO, LAKE ONTARIO	LAK	b	0.01380	0.00000		WALL79
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76

Table C-15. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
UNITED STATES	b	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76

Table C-15. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
USA, CALIFORNIA	GW	22	0.00000	0.00000	d, s	MAD082
VIRGIN ISLANDS, ST. THOMAS	CIS	15	0.00000	0.00000	d	LEN072
VIRGIN ISLANDS, ST. JOHN	CIS	14	0.00000	0.15000		LEN072

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.
[b] Uncertain.
[c] Depth = 33 m.
[d] Not detected.
[e] Average detected <0.009 ppb.
[f] Detection limit< 1 ng/L.
[g] Detection limit = 3 ng/L.
[h] Average detected <0.10 ppb.
[i] Drainage No. 1.
[j] Drainage No. 2.
[k] Drainage No. 3.
[l] Drainage No. 4.
[m] Drainage No. 5.
[n] Depth = 0 m.
[o] Depth = 50 m.
[p] Depth = 500 m.
[q] Depth = 1000 m.
[r] Average detected <0.5 ng/L.
[s] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 136
Number of samples within detection limits: 25
Mean of the highest reported values: 102.99434
Highest of the reported values: 1060.00000
Standard deviation: 280.18708
Mean of the natural logarithms: -2.15503
Standard deviation of the natural logarithms: 4.66278

Table C-16. Monitoring data for p,p'-DDE in water.

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	b	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	b	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	b	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	c	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	d	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	d	TANA82
ARGENTINA, PARANA RIVER, 600 KM ABOVE THE MOUTH	RIV	14	0.00000	0.00000	e	LENA84
CANADA, HAMILTON, LAKE ONTARIO	LAK	f	0.03740	0.00000	g	WALL79
CANADA, TORONTO, LAKE ONTARIO	LAK	f	0.02050	0.00000		WALL79
CANADA/USA, NIAGARA RIVER	RIV	f	0.01390	0.00000		WALL79
CANADA, COLBURG, LAKE ONTARIO	LAK	f	0.04520	0.00000		WALL79
INDOCHINA, SOUTH CHINA SEA	OCE	1	0.00001	0.00000		TANA82
SOUTH CHINA SEA	OCE	1	0.00001	0.00000		TANA82
CORAL SEA	OCE	1	0.00001	0.00000		TANA82
CORAL SEA	OCE	1	0.00000	0.00000	d	TANA82
CORAL SEA	OCE	1	0.00000	0.00000	d	TANA82
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.08000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83

Table C-16. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	e	ELZA83
EGYPT, LAKE MARIUT	LAK	12	4.49000	0.00000		SAAD82
EGYPT, MAHMOUDIEH CANAL	SW	1	0.65000	0.00000		ELSE79
EGYPT, EL-SOYOUF WATER TREATMENT PLANT	SW	1	0.47000	0.00000		ELSE79
EGYPT, MAHMOUDIEH	TAP	1	0.47000	0.00000		ELSE79
EGYPT, ABEES	WST	1	0.95000	0.00000		ELSE79
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.00000	0.01000		HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00000	0.00000	e	HERZ72

Table C-16. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.00000	0.00000	e	HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00000	0.00000	e	HERZ72
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.00000	0.08500		HERZ72
INDONESIA, JEPARA	BRK	2	0.00000	0.00000	h	PURN77
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	2	0.02000	0.04000		PURN77
INDONESIA, JAVA SEA	OCE	1	0.00001	0.00000		TANA82
INDIA, SATHIAR RESERVOIR	RES	2	0.00000	0.00000	i	KANN79
INDIA, SATHIAR RESERVOIR	RES	12	0.00000	0.00650		KANN79
INDIA, SATHIAR RESERVOIR	RES	1	0.00600	0.00000		KANN79
INDIA, MYSORE DISTRICT	f	13	0.00000	2100.00000		RAJU82
INDIAN OCEAN, JAVA TRENCH	OCE	1	0.00001	0.00000		TANA82
INDIAN OCEAN, S. OF INDONESIA	OCE	1	0.00000	0.00000	c	TANA82
INDIAN OCEAN	OCE	1	0.00000	0.00000	b	TANA82
INDIAN OCEAN, OFF W. AUSTRALIA	OCE	1	0.00000	0.00000	b	TANA82
INDIAN OCEAN, S. OF AUSTRALIA	OCE	1	0.00000	0.00300	d	TANA82
ISRAEL, JORDAN RIVER	RIV	13	0.00000	0.50000		PAZ76
ITALY, COASTAL ARCH W. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.03000		POLE83
JAPAN, TOKYO BAY	OCE	7	0.00068	0.00097		ALLA83
JAPAN, RYUKU RETTO, N. PACIFIC OCEAN	OCE	1	0.00001	0.00000		TANA82
JAPAN, NAMPO, SHOTO/IZU TRENCH, N. PACIFIC OCEAN	OCE	1	0.00000	0.00000	b	TANA82
JAPAN, NAMPO, SHOTO, N. PACIFIC OCEAN	OCE	1	0.00000	0.00000	d	TANA82
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	j	GREI73A
KENYA, NZOIA RIVER CATCHMENT	RIV	11	0.00000	0.00000	k	KALL77
KENYA, NZOIA RIVER CATCHMENT	RIV	13	0.00000	0.00000	j	KALL77

Table C-16. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
MALAYSIA, KRIAN DIST, PERAK STATE, TANJONG PIANDANG	PAD	3	0.10000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI KOTA FIELD	PAD	3	0.10000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, JALAN BHARU SUMP	PND	3	0.10000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK, PARIT, TANJONG PIANDANG	CAN	3	0.20000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI BURONG	CAN	3	0.30000	0.00000		MEIE83
PACIFIC OCEAN, MELANESIA	OCE	1	0.00000	0.00000	c	TANA82
N. PACIFIC OCEAN, EAST CAROLINE BASIN	OCE	1	0.00000	0.00000	d	TANA82
N. PACIFIC OCEAN, MARIANA TRENCH	OCE	1	0.00000	0.00000	b	TANA82
N. PACIFIC OCEAN, AGRIHAN ISLAND	OCE	1	0.00000	0.00000	b	TANA82
N. PACIFIC OCEAN	OCE	1	0.00000	0.00000	b	TANA82
RHODESIA, LAKE MCILWAINE	LAK	1	0.10000	0.00000		GREI78B
REP. S. AFRICA, TRANSVAAL, HARTBEESPOORT DAM	LAK	1	0.10000	0.00000		GREI77
REP. S. AFRICA, CAPE PROVINCE, VOELVLEI DAM	LAK	1	0.00000	0.00000	j	GREI77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00520	0.00000	l	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00160	0.00000	m	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00270	0.00000	m	OSTE77
SOUTH of SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00080	0.00000	n	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00110	0.00000	n	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00050	0.00000	n	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00060	0.00000	n	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00000	0.00000		OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00050	0.00000	n	OSTE77
TASMAN SEA	OCE	1	0.00000	0.00000	c	TANA82
TURKEY, LOWER SEYHAN DELTA	DRN	2	10.00000	70.00000	o	CIWA82
TURKEY, LOWER SEYHAN DELTA	DRN	2	600.00000	0.00000	p	CIWA82
UGANDA, OKOKORIO LAKE, KYOGA OR SALISBURY	LAK	1	0.00000	0.00000	e	SSER74
UGANDA, KAGWARA LAKE, KYOGA OR SALISBURY	LAK	1	0.00000	0.00000	e	SSER74
UGANDA, BUGONDO LAKE, KYOGA OR SALISBURY	LAK	1	0.00000	0.00000	e	SSER74
UGANDA, NAMASAGALI LAKE, KYOGA OR SALISBURY	LAK	1	1.80000	0.00000		SSER74

Table C-16. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
USA, ATLANTIC OCEAN	OCE	1	0.00000	0.00350	q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	f	0.00000	0.00000	r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	f	0.00000	0.00000	s	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	f	0.00000	0.00000	t	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00390	0.00000	q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	s	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	t	JONA76
USA, NEW YORK, OLCOTT, LAKE ONTARIO	LAK	f	0.02680	0.00000		WALL79
USA, NEW YORK, ROCHESTER, LAKE ONTARIO	LAK	f	0.02990	0.00000		WALL79
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	s	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	t	JONA76
USA/CANADA, LAKE ONTARIO	LAK	f	0.00940	0.00000		WALL79
USA, NEW YORK, OSWEGO, LAKE ONTARIO	LAK	f	0.02240	0.00000		WALL79
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00600	0.00000	q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.70000	0.00000	r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00230	0.00000	s	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	e, t	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00750	0.00000	q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00430	0.00000	r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00510	0.00000	s	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00120	0.00000	t	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00330	0.00000	q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.01030	0.00000	r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.01540	0.00000	s	JONA76
UNITED STATES	f	1	0.00490	0.00000	t	JONA76

Table C-16. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	q, u	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	r, u	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00010	0.00000	s	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00710	0.00000	t	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00410	0.00000	q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00070	0.00000	r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00020	0.00000	s	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00080	0.00000	t	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00070	0.00000	q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00210	0.00000	r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00230	0.00000	s	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00220	0.00000	t	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00140	0.00000	q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00100	0.00000	r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00250	0.00000	s	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00150	0.00000	t	JONA76
USA, MISSISSIPPI VALLEY WATERSHED	RNF	6	0.20000	0.50000		WILL83
USA, CALIFORNIA	GW	22	0.00000	0.00000	e, v	MADD82

Table C-16. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
VIRGIN ISLANDS, ST. THOMAS	CIS	15	0.00000	0.00000	e	LEN072
VIRGIN ISLANDS, ST. JOHN	CIS	14	0.00000	0.02000		LEN072

Statistics:
Number of locations sampled: 159
Number of samples within detection limits: 76
Mean of the highest reported values: 36.60689
Highest of the reported values: 2100.00000
Standard deviation: 249.61521
Mean of the natural logarithms: -4.56027
Standard deviation of the natural logarithms: 3.69180

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.
[b] Average detected <0.001 ng/L.
[c] Average detected <0.003 ng/L.
[d] Average detected <0.002 ng/L.
[e] Not detected.
[f] Uncertain.
[g] Depth = 33 m.
[h] Average detected <0.0045 ppb.
[i] Trace amounts detected.
[j] Average detected <0.10 ppb.
[k] Average detected <0.20 ppb.
[l] Depth = 0.5 m.
[m] Depth = 20.0 m.
[n] Depth = 4 m.
[o] Drainage No. 4.
[p] Drainage No. 5.
[q] Depth = 0 m.
[r] Depth = 50 m.
[s] Depth = 500 m.
[t] Depth = 1000 m.
[u] Average detected <0.35 ng/L.
[v] Detection limit = 5.0 ppb.

Table C-17. Monitoring data for o,p'-DDT in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	b	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	b	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	b	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	c	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	d	TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000	d	TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	e, f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00009	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	e, f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f, g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f, g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	e, f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00030	0.00000	g, h	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00006	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	e, f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	e, f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00008	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	e, f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	e, f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00008	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	e, f	BIDL73

Table C-17. (Continued)

Location	Water type[a]	No. of samples	Reported values (μg/L) Average	Maximum	Comments	Reference
BERMUDA, SARGASSO SEA	OCE	1	0.00006	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	e, f	BIDL73
INDOCHINA, SOUTH CHINA SEA	OCE	1	0.00002	0.00000		TANA82
SOUTH CHINA SEA	OCE	1	0.00001	0.00000		TANA82
CORAL SEA	OCE	1	0.00001	0.00000		TANA82
CORAL SEA	OCE	1	0.00001	0.00000		TANA82
CORAL SEA	OCE	1	0.00001	0.00000		TANA82
EGYPT, LAKE MARIUT	LAK	12	0.01000	0.00000		SAAD82
EGYPT, MAHMOUDIEH CANAL	SW	1	0.95000	0.00000		ELSE79
INDONESIA, JAVA SEA	OCE	1	0.00001	0.00000		TANA82
INDIAN OCEAN, JAVA TRENCH	OCE	1	0.00003	0.00000		TANA82
INDIAN OCEAN, S. OF INDONESIA	OCE	1	0.00001	0.00000		TANA82
INDIAN OCEAN	OCE	1	0.00000	0.00000	b	TANA82
INDIAN OCEAN, OFF W. AUSTRALIA	OCE	1	0.00000	0.00000	i	TANA82
INDIAN OCEAN, S. OF AUSTRALIA	OCE	1	0.00000	0.00000	c	TANA82
JAPAN, RYUKU RETTO, N. PACIFIC OCEAN	OCE	1	0.00001	0.00000		TANA82
JAPAN, NAMPO, SHOTO/IZU TRENCH, N. PACIFIC OCEAN	OCE	1	0.00000	0.00000	c	TANA82
JAPAN, NAMPO, SHOTO, N. PACIFIC OCEAN	OCE	1	0.00000	0.00000	d	TANA82
PACIFIC OCEAN, MELANESIA	OCE	1	0.00001	0.00000		TANA82
N. PACIFIC OCEAN, EAST CAROLINE BASIN	OCE	1	0.00001	0.00000		TANA82
N. PACIFIC OCEAN, MARIANA TRENCH	OCE	1	0.00000	0.00000	c	TANA82
N. PACIFIC OCEAN, AGRIHAN ISLAND	OCE	1	0.00000	0.00000	i	TANA82

Table C-17. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
N. PACIFIC OCEAN	OCE	1	0.00001	0.00000		TANA82
TASMAN SEA	OCE	1	0.00001	0.00000		TANA82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Average detected <0.001 ng/L.

[c] Average detected <0.003 ng/L.

[d] Average detected <0.004 ng/L.

[e] Depth = 30 cm.

[f] Average detected <0.05 ng/L.

[h] In sargassum windrow.

[i] Average detected = 0.002 ng/L.

Statistics:
Number of locations sampled: 46
Number of samples within detection limits: 22
Mean of the highest reported values: 0.04367
Highest of the reported values: 0.95000
Standard deviation: 0.20244
Mean of the natural logarithms: -9.95830
Standard deviation of the natural logarithms: 2.77635

Table C-18. Monitoring data for p,p'-DDT in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ANTARCTICA, TOTTUKI POINT	OCE	1	0.00000	0.00000	b	TANA83
ANTARCTICA, LANGHOVDE	OCE	1	0.00000	0.00000	b	TANA83
ANTARCTICA, KITANO-URA COVE	OCE	1	0.00000	0.00000	b	TANA83
ANTARCTICA, NURUME LAKE	LAK	1	0.00000	0.00000	b	TANA83
ANTARCTICA	OCE	1	0.00001	0.00000		TANA83
ANTARCTICA	OCE	1	0.00002	0.00000	c	TANA83
ANTARCTICA	OCE	1	0.00002	0.00000	c	TANA83
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00000	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00002	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00002	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00002	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00003	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00001	0.00000		TANA82
ANTARCTIC OCEAN	OCE	1	0.00002	0.00000		TANA82
ARABIAN SEA	OCE	1	0.00016	0.00000		TANA80
ARABIAN SEA	OCE	1	0.00016	0.00000		TANA80
ARABIAN SEA	OCE	1	0.00012	0.00000		TANA80
ARABIAN SEA	OCE	1	0.00006	0.00000		TANA80
ARGENTINA, PARANA RIVER, 600 KM ABOVE THE MOUTH	RIV	14	0.00000	0.00000	d	LENA84
AUSTRALIA, NAMOI VALLEY, WEE WAA, N.S.W.	CIS	30	0.00000	0.00000		OUW 74
BELGIUM, EYSDEN, RIVER MEUSE	RIV	e	0.05000	0.13000		WEGM78
BAY OF BENGAL	OCE	1	0.00008	0.00000		TANA80

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
BAY OF BENGAL	OCE	1	0.00008	0.00000		TANA80
BAY OF BENGAL	OCE	1	0.00009	0.00000		TANA80
BERING SEA	OCE	1	0.00001	0.00000		TANA80
BERING SEA	OCE	1	0.00002	0.00000		TANA80
BERING SEA	OCE	1	0.00002	0.00000		TANA80
BERING SEA	OCE	1	0.00001	0.00000		TANA80
BERING SEA	OCE	1	0.00003	0.00000		TANA80
BERING SEA	OCE	1	0.00004	0.00000		TANA80
BERING SEA	OCE	1	0.00002	0.00000		TANA80
BERMUDA, SARGASSO SEA	OCE	1	0.00050	0.00000	f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00040	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00030	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00003	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00210	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00060	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00020	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00070	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00020	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00030	0.00000	g	BIDL73
BERMUDA, SARGASSO SEA	OCE	1	0.00000	0.00000	f	BIDL73
CANADA, HAMILTON, LAKE ONTARIO	LAK	e	0.00450	0.00000	h	WALL79

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
CANADA, TORONTO, LAKE ONTARIO	LAK	e	0.00140	0.00000		WALL79
CANADA/USA, NIAGARA RIVER	RIV	e	0.00240	0.00000		WALL79
CANADA, COLBURG, LAKE ONTARIO	LAK	e	0.00720	0.00000		WALL79
EAST CHINA SEA	OCE	1	0.00006	0.00000		TANA80
SOUTH CHINA SEA	OCE	1	0.00008	0.00000		TANA80
SOUTH CHINA SEA	OCE	1	0.00009	0.00000		TANA80
INDOCHINA, SOUTH CHINA SEA	OCE	1	0.00009	0.00000		TANA82
INDOCHINA, SOUTH CHINA SEA	OCE	1	0.00012	0.00000		TANA82
SOUTH CHINA SEA	OCE	1	0.00003	0.00000		TANA82
SOUTH CHINA SEA	OCE	1	0.00005	0.00000		TANA82
CORAL SEA	OCE	1	0.00001	0.00000		TANA82
CORAL SEA	OCE	1	0.00002	0.00000		TANA82
CORAL SEA	OCE	1	0.00001	0.00000		TANA82
CORAL SEA	OCE	1	0.00002	0.00000		TANA82
CORAL SEA	OCE	1	0.00001	0.00000		TANA82
CORAL SEA	OCE	1	0.00002	0.00000		TANA82
EGYPT, EL-SALAAM	GW	1	1.00000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00062	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	1.07000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.17000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.90000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.20000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.54000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.24000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.02000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.12000	0.00000		ELZA83

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
EGYPT, EL-SALAAM	GW	1	0.88000	0.00000		ELZA83
EGYPT, LAKE MARIUT	LAK	12	0.13000	0.00000		SAAD82
EGYPT, EL-SOYOUF WATER TREATMENT PLANT	SW	1	0.00000	0.00000	d	ELSE79
EGYPT, MAHMOUDIEH	TAP	1	0.95000	0.00000		ELSE79
EGYPT, ABEES	WST	1	0.25000	0.00000		ELSE79
FRANCE, MEDITERRANEAN SEA, 10 MI. FROM COAST	OCE	32	0.00800	0.09000		MEST83
FRANCE, MEDITERRANEAN SEA, LITTORAL PONDS	PND	96	0.11800	0.57500		MEST83
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.16500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.00000	0.17000		HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.00000	0.05500		HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00000	0.00000	d	HERZ72

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.10000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00000	0.04500		HERZ72
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.00000	0.13500		HERZ72
GULF OF MEXICO, OFF MISSISSIPPI	OCE	35	0.00060	0.00000		GIAM76
INDONESIA, JEPARA	BRK	1	0.01000	0.00000		PURN77
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	2	0.01000	0.01000		PURN77
INDONESIA, JAVA SEA	OCE	1	0.00003	0.00000		TANA82
INDONESIA, JAVA SEA	OCE	1	0.00006	0.00000		TANA82
INDIA, SATHIAR RESERVOIR	RES	2	0.00800	0.00850		KANN79
INDIA, SATHIAR RESERVOIR	RES	12	0.00000	0.00930		KANN79
INDIA, SATHIAR RESERVOIR	RES	1	0.00540	0.00000		KANN79
INDIA, CALCUTTA	GW	4	0.00000	0.00000	d	MUKH80
INDIA, CALCUTTA, GANGES RIVER	RIV	2	0.00000	0.00000	d	MUKH80
INDIA, CALCUTTA	SW	2	0.00000	0.00000	d	MUKH80
INDIA, CALCUTTA	PND	2	1500.00000	0.00000		MUKH80
INDIA, DELHI, JAMUNA RIVER	RIV	1	0.06000	0.96000		SAST83
INDIA, DELHI, JAMUNA RIVER	RIV	e	0.00000	0.00000	f	SAST83
INDIAN OCEAN, JAVA TRENCH	OCE	1	0.00009	0.00000		TANA82
INDIAN OCEAN, JAVA TRENCH	OCE	1	0.00013	0.00000		TANA82
INDIAN OCEAN, S. OF INDONESIA	OCE	1	0.00002	0.00000		TANA82
INDIAN OCEAN, S. OF INDONESIA	OCE	1	0.00003	0.00000		TANA82
INDIAN OCEAN	OCE	1	0.00001	0.00000		TANA82
INDIAN OCEAN	OCE	1	0.00001	0.00000		TANA82
INDIAN OCEAN, OFF W. AUSTRALIA	OCE	1	0.00001	0.00000		TANA82
INDIAN OCEAN, OFF W. AUSTRALIA	OCE	1	0.00001	0.00000		TANA82

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
INDIAN OCEAN, S. OF AUSTRALIA	OCE	1	0.00005	0.00000		TANA82
INDIAN OCEAN, S. OF AUSTRALIA	OCE	1	0.00006	0.00000		TANA82
ISRAEL, LAKE KINNERET	LAK	19	0.00000	0.01580	j	KAHA74
ISRAEL, LAKE KINNERET WATERSHED, DAN RIVER AT FOUNT	RIV	1	0.00000	0.00000	d, j	KAHA74
ISRAEL, JORDAN RIVER	RIV	6	0.00000	0.00400	j	KAHA74
ISRAEL, NESHUSHIM RIVER	RIV	1	0.00000	0.00000	d, j	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	d, j	KAHA74
ISRAEL, JORDAN RIVER (LOWER)	RIV	1	0.00000	0.00000	d, j	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.00000	0.00000	d, j	KAHA74
ISRAEL, BEL-NOTAFA RESERVOIR	RES	1	0.00090	0.00000	j	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00000	0.00000	d, j	KAHA74
ISRAEL, KISHON RESERVOIR, NORTH	RES	1	0.00600	0.00000	j	KAHA74
ISRAEL, KISHON RESERVOIR, SOUTH	RES	2	0.00000	0.00000	j	KAHA74
ISRAEL, GEVAT RESERVOIR	RES	3	0.00060	0.00150	j	KAHA74
ISRAEL, GEVAT RESERVOIR (ENTRANCE)	RES	4	0.00060	0.00800	j	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00010	0.00000	j	KAHA74
ISRAEL, JORDAN RIVER	RIV	13	0.00000	0.04000		PAZ76
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	e	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ITALY, PO RIVER	RIV	18	0.00000	0.00000	d, k	GALA81
ITALY, ADIGE RIVER	RIV	18	0.00000	0.00000	d, k	GALA81
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.05000		POLE83
JAPAN, KITAKYUSHU DISTRICT, TONDA RESERVOIR	SW	10	0.00000	0.00000	d	YAMA80B
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RIV	10	0.00000	0.00000	d	YAMA80B
JAPAN, RYUKU RETTO, N. PACIFIC OCEAN	OCE	1	0.00004	0.00000		TANA82
JAPAN, RYUKU RETTO, N. PACIFIC OCEAN	OCE	1	0.00005	0.00000		TANA82
JAPAN, NAMPO SHOTO/IZU TRENCH, N. PACIFIC OCEAN	OCE	1	0.00001	0.00000		TANA82
JAPAN, NAMPO SHOTO/IZU TRENCH, N. PACIFIC OCEAN	OCE	1	0.00001	0.00000		TANA82
JAPAN, NAMPO SHOTO, N. PACIFIC OCEAN	OCE	1	0.00001	0.00000		TANA82
JAPAN, NAMPO SHOTO, N. PACIFIC OCEAN	OCE	1	0.00002	0.00000		TANA82
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000		GREI78A
KENYA, NZOIA RIVER CATCHMENT	RIV	11	0.00000	0.00000		KALL77
KENYA, NZOIA RIVER CATCHMENT	RIV	13	0.00000	0.00000		KALL77
KENYA, LAKE NAKURU	LAK	e	0.00000	0.00000		KALL77
KENYA, LAKE ELEMENTEITA	LAK	e	0.00000	0.00000		KALL77
KENYA, LAKE NAIVASHA	LAK	e	0.00000	0.00000		KALL77
KENYA, MALEWA RIVER	RIV	e	0.00000	0.00000		KALL77
KENYA, GILGIL RIVER	RIV	e	0.00000	0.00000		KALL77
MALAYSIA, KRIAN DIST, PERAK STATE, TANJONG PIANDANG	PAD	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI KOTA FIELD	PAD	3	1.60000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, JALAN BHARU SUMP	PND	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK, PARIT, TANJONG PIANDANG	CAN	3	0.40000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI BURONG	CAN	3	0.20000	0.00000		MEIE83
MEXICO, GULF OF MEXICO COAST	OCE	10	0.00035	0.00060		GIAM73
NETHERLANDS/GERMANY, LOBITH, RHINE RIVER	RIV	e	0.02000	0.31000		WEGM76
PACIFIC OCEAN, MELANESIA	OCE	1	0.00002	0.00000		TANA82

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
PACIFIC OCEAN, MELANESIA	OCE	1	0.00003	0.00000		TANA82
N. PACIFIC OCEAN, EAST CAROLINE BASIN	OCE	1	0.00002	0.00000		TANA82
N. PACIFIC OCEAN, EAST CAROLINE BASIN	OCE	1	0.00003	0.00000		TANA82
N. PACIFIC OCEAN, MARIANA TRENCH	OCE	1	0.00001	0.00000		TANA82
N. PACIFIC OCEAN, MARIANA TRENCH	OCE	1	0.00001	0.00000		TANA82
N. PACIFIC OCEAN, AGRIHAN ISLAND	OCE	1	0.00001	0.00000		TANA82
N. PACIFIC OCEAN, AGRIHAN ISLAND	OCE	1	0.00001	0.00000		TANA82
N. PACIFIC OCEAN	OCE	1	0.00002	0.00000		TANA82
N. PACIFIC OCEAN	OCE	1	0.00003	0.00000		TANA82
NORTHWEST PACIFIC OCEAN	OCE	1	0.00009	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00014	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00023	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00008	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00015	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00009	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00011	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00011	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00016	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00006	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00008	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00007	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00007	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00077	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00135	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00094	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00116	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00078	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00072	0.00000		TANA80

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
NORTHWEST PACIFIC OCEAN	OCE	1	0.00096	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00052	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00022	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00027	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00020	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00027	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00026	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00027	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00002	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00002	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00005	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00075	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00117	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00031	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00025	0.00000		TANA80
NORTHWEST PACIFIC OCEAN	OCE	1	0.00048	0.00000		TANA80
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000		GREI788
REP. S. AFRICA, TRANSVAAL, HARTBEESPOORT DAM	LAK	1	0.10000	0.00000		GREI77
REP. S. AFRICA, CAPE PROVINCE, VOELVLEI DAM	LAK	1	0.03000	0.00000		GREI77
REP. S. AFRICA, KRUGER NATIONAL PARK, LETABA RIVER	RIV	65	0.00050	0.00100		VAND78
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00000	0.00000	d, l	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00021	0.00000	m	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00000	0.00000	d, m	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00000	0.00000	d, n	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00010	0.00000	n	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00000	0.00000	d, n	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00000	0.00000	d, n	OSTE77
SOUTH OF SWEDEN, HANO BIGHT AREA, BALTIC SEA	OCE	1	0.00000	0.00000	d, m	OSTE77

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
TASMAN SEA	OCE	1	0.00001	0.00000		TANA82
TASMAN SEA	OCE	1	0.00002	0.00000		TANA82
TURKEY, LOWER SEYHAN DELTA	DRN	3	70.00000	420.00000		CINA82
TURKEY, LOWER SEYHAN DELTA	DRN	3	20.00000	60.00000		CINA82
TURKEY, LOWER SEYHAN DELTA	DRN	4	30.00000	150.00000		CINA82
TURKEY, LOWER SEYHAN DELTA	DRN	1	20.00000	0.00000		CINA82
TURKEY, LOWER SEYHAN DELTA	DRN	1	30.00000	0.00000		CINA82
UGANDA, OKOKORIO LAKE, KYOGA OR SALISBURY	LAK	1	0.30000	0.00000		SSER74
UGANDA, KAGWARA LAKE, KYOGA OR SALISBURY	LAK	1	0.80000	0.00000		SSER74
UGANDA, BUGONDO LAKE, KYOGA OR SALISBURY	LAK	1	0.60000	0.00000		SSER74
UGANDA, NAMASAGALI LAKE, KYOGA OR SALISBURY	LAK	1	0.00000	0.00000	d	SSER74
USA, MISSISSIPPI, MISSISSIPPI RIVER	RIV	35	0.00230	0.00000		GIAM76
USA, ATLANTIC OCEAN	OCE	e	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	e	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	e	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	e	0.00000	0.00000	d, r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, r	JONA76
USA, NEW YORK, OLCOTT, LAKE ONTARIO	LAK	e	0.00460	0.00000		WALL79
USA, NEW YORK, ROCHESTER, LAKE ONTARIO	LAK	e	0.00230	0.00000		WALL79
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, r	JONA76
USA/CANADA, LAKE ONTARIO	LAK	e	0.00650	0.00000		WALL79
USA, NEW YORK, OSWEGO, LAKE ONTARIO	LAK	e	0.01280	0.00000		WALL79
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
UNITED STATES	e	1	0.00000	0.00000	d, r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, r	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, o	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, p	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, q	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, r	JONA76
USA, ALABAMA, HARTSELLE, FLINT CREEK	CRK	13	0.00000	0.00000	d	NICH64

Table C-18. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
USA, MISSISSIPPI VALLEY WATERSHED	RNF	6	2.80000	5.40000		WILL83
USA, CALIFORNIA	GW	22	0.00000	0.00000	d, s	MADD82
VIRGIN ISLANDS, ST. THOMAS	CIS	15	0.00000	0.00000	d	LENO72
VIRGIN ISLANDS, ST. JOHN	CIS	14	0.00000	0.00000	d	LENO72

a Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.
b Under ice.
c Outer margin of pack ice.
d Not detected.
e Uncertain.
f Depth = 30 cm.
g Depth = 150 µm.
h Depth = 33 m.
i Not detected in drinking water from the river.
j Detection limit <1 ng/L.
k Detection limit = 4 ng/L.
l Depth = 0.5 m.
m Depth = 20.0 m.
n Depth = 4 m.
o Depth = 0 m.
p Depth = 50 m.
q Depth = 500 m.
r Depth = 1000 m.
s Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 314
Number of samples within detection limits: 184
Mean of the highest reported values: 11.95023
Highest of the reported values: 1500.00000
Standard deviation: 115.17539
Mean of the natural logarithms: -7.15110
Standard deviation of the natural logarithms: 4.15386

Table C-19. Monitoring data for diazinon in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	b	0.02000	0.00000		GREV72
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	b	0.05000	9.00000		GREV72
IRAN	PAD	80	0.00000	60.00000		TEIN79
ISRAEL, LAKE KINNERET	LAK	21	0.00000	0.00000	c, d	KAHA74
ISRAEL, JORDAN RIVER	RIV	6	0.00000	0.00000	c, d	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	c, d	KAHA74
ISRAEL, JORDAN RIVER (LOWER)	RIV	1	0.00000	0.00000	c, d	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.00000	0.00000	c, d	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00000	0.00000	c, d	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00000	0.00000	c, d	KAHA74
USA, CALIFORNIA	GW	27	0.00000	0.00000	d, e	MADO82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Uncertain.

[c] Detection limit <1 ng/L.

[d] Not detected.

[e] Detection limit = 5.0 ppb.

Statistics:

Number of locations sampled: 11

Number of samples within detection limits: 3

Mean of the highest reported values: 20.02333

Highest of the reported values: 60.00000

Standard deviation: 34.62081

Mean of the natural logarithms: -0.93779

Standard deviation of the natural logarithms: 4.38199

Table C-20. Monitori… ieldrin in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
BELGIUM, EYSDEN, RIVER MEUSE	RIV	b	0.01000	0.03000		WEGM78
CANADA, HAMILTON, LAKE ONTARIO	LAK	b	0.00310	0.00000	c	WALL79
CANADA, TORONTO, LAKE ONTARIO	LAK	b	0.00350	0.00000		WALL79
CANADA/USA, NIAGARA RIVER	RIV	b	0.00210	0.00000		WALL79
CANADA, COLBURG, LAKE ONTARIO	LAK	b	0.00990	0.00000		WALL79
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.30000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.31000	0.00000		ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
EGYPT, EL-SALAAM	GW	1	0.00000	0.00000	d	ELZA83
FRANCE, MEDITERRANEAN SEA, 10 MI. FROM COAST	OCE	24	0.02600	0.07400		MEST83
FRANCE, MEDITERRANEAN SEA, LITTORAL PONDS	PND	68	0.00000	0.00000	d	MEST83
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00000	0.04500		HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72

Table C-20. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00000	0.00000	d	HERZ72
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.00000	0.00000	d	HERZ72
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	b	0.00000	0.00000	d	PURN77
ISRAEL, LAKE KINNERET	LAK	19	0.00000	0.00060	e	KAHA74
ISRAEL, LAKE KINNERET WATERSHED, DAN RIVER AT FOUNT	RIV	1	0.00000	0.00000	d, e	KAHA74
ISRAEL, JORDAN RIVER	RIV	5	0.00000	0.00000	e, f	KAHA74
ISRAEL, NESHUSHIM RIVER	RIV	1	0.00000	0.00000	d, e	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	d, e	KAHA74
ISRAEL, JORDAN RIVER (LOWER)	RIV	1	0.00000	0.00000	d, e	KAHA74

Table C-20. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ISRAEL, YASUOR RESERVOIR	RES	1	0.00000	0.00000	d, e	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00020	0.00000	e	KAHA74
ISREAL, KISHON RESERVOIR, NORTH	RES	1	0.00000	0.00000	d, e	KAHA74
ISRAEL, KISHON RESERVOIR, SOUTH	RES	2	0.00000	0.00100	e	KAHA74
ISRAEL, GEVAT RESERVOIR	RES	3	0.00000	0.00500	e	KAHA74
ISRAEL, GEVAT RESERVOIR ENTRANCE	RES	4	0.00000	0.00110	e	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00060	0.00000	e	KAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	d	LAHA74
ITALY, PO RIVER	RIV	18	0.00000	0.00000	f, g	GALA81
ITALY, ADIGE RIVER	RIV	18	0.00000	0.00000	f, g	GALA81
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.03000		POLE83
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	h	GREI78A
KENYA, NZOIA RIVER CATCHMENT	RIV	11	0.00000	0.00000	i	KALL77
KENYA, NZOIA RIVER CATCHMENT	RIV	13	0.00000	0.00000	h	KALL77
KENYA, LAKE NAKURU	LAK	b	0.00000	0.00000	j	KALL77
KENYA, LAKE ELEMENTEITA	LAK	b	0.00000	0.00000	j	KALL77
KENYA, LAKE NAIVASHA	LAK	b	0.00000	0.00000	j	KALL77

Table C-20. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
KENYA, MALEWA RIVER	RIV	b	0.00000	0.00000	j	KALL77
KENYA, GILGIL RIVER	RIV	b	0.00000	0.00000	j	KALL77
MALAYSIA, KRIAN DIST, PERAK STATE, TANJONG PIANDANG	PAD	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI KOTA FIELD	PAD	3	0.40000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, JALAN BHARU SUMP	PND	3	0.00000	0.00000	d	MEIE83
MALAYSIA, KRIAN DIST, PERAK, PARIT TANJONG PIANDANG	CAN	3	0.20000	0.00000		MEIE83
MALAYSIA, KRIAN DIST, PERAK STATE, SUNGEI BURONG	CAN	3	0.50000	0.00000		MEIE83
NETHERLANDS/GERMANY, LOBITH, RHINE RIVER	RIV	b	0.02000	0.06000		WEGM78
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	h	GREI78B
REP. S. AFRICA, TRANSVAAL, HARTBEESPOORT DAM	LAK	1	0.00000	0.00000	h	GREI77
REP. S. AFRICA, CAPE PROVINCE, VOELVLEI DAM	LAK	1	0.00000	0.00000	h	GREI77
REP. S. AFRICA, KRUGER NATIONAL PARK, LETABA RIVER	RIV	65	0.00169	0.00000		VAND78
REP. S. AFRICA, KRUGER NATIONAL PARK, OLIFANTS RIVER	RIV	65	0.00285	0.00000		VAND78
USA, ATLANTIC OCEAN	OCE	1	0.00620	0.00000	k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	b	0.00000	0.00000	d, l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	b	0.00000	0.00000	d, m	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	b	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.01940	0.00000	k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, m	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NEW YORK, OLCOTT, LAKE ONTARIO	LAK	b	0.00390	0.00000		WALL79
USA, NEW YORK, ROCHESTER, LAKE ONTARIO	LAK	b	0.00220	0.00000		WALL79
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, m	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA/CANADA, LAKE ONTARIO	LAK	b	0.01600	0.00000		WALL79
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00610	0.00000	k	JONA76

Table C-20. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00570	0.00000	l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00620	0.00000	m	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	d, n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00040	0.00000	k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00640	0.00000	l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00480	0.00000	m	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00810	0.00000	n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.01060	0.00000	k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00330	0.00000	l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.01190	0.00000	m	JONA76
UNITED STATES	b	1	0.00400	0.00000	n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00610	0.00000	k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00810	0.00000	l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.40000	0.00000	m	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.01830	0.00000	n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00390	0.00000	k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00980	0.00000	l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00000	0.00000	i, m	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00630	0.00000	n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00050	0.00000	k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00220	0.00000	l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00110	0.00000	m	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00480	0.00000	n	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00870	0.00000	k	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00780	0.00000	l	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00100	0.00000	m	JONA76
USA, NORTH ATLANTIC OCEAN	OCE	1	0.00040	0.00000	n	JONA76

Table C-20. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
VIRGIN ISLANDS, ST. THOMAS	CIS	15	0.00000	0.10000		LEN072
VIRGIN ISLANDS, ST. JOHN	CIS	14	0.00000	1.03000		LEN072

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Uncertain.

[c] Depth = 33 m.

[d] Not detected.

[e] Detection limit <1 ng/L.

[f] Trace amounts detected.

[g] Detection limit ≈ 3 ng/L.

[h] Average detected <0.10 ppb.

[i] Average detected <0.20 ppb.

[j] Average detected <0.04 ppb.

[k] Depth = 0 m.

[l] Depth = 50 m.

[m] Depth = 500 m.

[n] Depth = 1000 m.

Statistics:
Number of locations sampled: 140
Number of samples within detection limits: 55
Mean of the highest reported values: 0.06736
Highest of the reported values: 1.03000
Standard deviation: 0.17387
Mean of the natural logarithms: -4.79764
Standard deviation of the natural logarithms: 1.99483

Table C-21. Monitoring data for dimethoate in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	b	0.07000	0.00000		GREV72
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	b	0.08000	0.00000		GREV72
USA, CALIFORNIA	GW	27	0.00000	0.00000	c, d	MADD82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Uncertain.

[c] Detection limit = 5.0 ppb.

[d] Not detected.

Statistics:
Number of locations sampled: 3
Number of samples within detection limits: 2
Mean of the highest reported values: 0.07500
Highest of the reported values: 0.08000
Standard deviation: 0.00707
Mean of the natural logarithms: -2.59249
Standard deviation of the natural logarithms: 0.09442

Table C-22. Monitoring data for endosulfan in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	2	0.00000	0.01000		PURN77
ISRAEL, LAKE KINNERET	LAK	21	0.00000	0.00000	b, c	KAHA74
ISRAEL, JORDAN RIVER	RIV	6	0.00000	0.00000	b, c	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	b, c	KAHA74
ISRAEL, JORDAN RIVER (LOWER)	RIV	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
EAST JAVA, BRANTAS DELTA	CAN	17	0.00000	0.55000		GORB71
EAST JAVA, BRANTAS DELTA	PND	17	0.00000	0.44000		GORB71
EAST JAVA, BRANTAS DELTA	RIV	25	0.00000	0.45000		GORB71
EAST JAVA, MADURA SEA	OCE	17	0.00000	0.30000		GORB71
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	c	GREI78A
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	c	GREI78B
REP. S. AFRICA, TRANSVAAL, HARTBEESPOORT DAM	LAK	1	0.00000	0.00000	c	GREI77
REP. S. AFRICA, CAPE PROVINCE, VOELVLEI DAM	LAK	1	0.00000	0.00000	c	GREI77

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Detection limit <1 ng/L.

[c] Not detected.

Statistics:
Number of locations sampled: 16
Number of samples within detection limits: 5
Mean of the highest reported values: 0.35000
Highest of the reported values: 0.55000
Standard deviation: 0.20938
Mean of the natural logarithms: -1.60527
Standard deviation of the natural logarithms: 1.69125

Table C-23. Monitoring data for alpha-endosulfan in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
BELGIUM, EYSDEN, RIVER MEUSE	RIV	b	0.01000	0.09000		WEGM78
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.00000	0.07000		HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.10000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.01000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.00000	0.00000	c	HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00000	0.00000	c	HERZ72

Table C-23. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.00000	0.00000	c	HERZ72
EAST JAVA, BRANTAS DELTA	CAN	17	0.00000	5.80000		GOR871
EAST JAVA, BRANTAS DELTA	PND	21	0.00000	0.25000		GOR871
EAST JAVA, BRANTAS RIVER DELTA	RIV	25	0.00000	5.00000		GOR871
EAST JAVA, MADURA SEA	OCE	17	0.00000	0.09000		GOR871
NETHERLANDS/GERMANY, LOBITH, RHINE RIVER	RIV	b	0.03000	0.24000		WEGM78
REP. S. AFRICA, KRUGER NATIONAL PARK, LEVUBU RIVER	RIV	65	0.00197	0.00634		VAND78
REP. S. AFRICA, KRUGER NATIONAL PARK, LETABA RIVER	RIV	65	0.00010	0.00000		VAND78
REP. S. AFRICA; KRUGER NATIONAL PARK, CROCODILE RIVER	RIV	65	0.00010	0.00127		VAND78
USA, CALIFORNIA	GW	22	0.00000	0.00000	c, d	MADD82

a Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

b Uncertain.

c Not detected.

d Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 38
Number of samples within detection limits: 12
Mean of the highest reported values: 0.97146
Highest of the reported values: 5.80000
Standard deviation: 2.07728
Mean of the natural logarithms: -2.89219
Standard deviation of the natural logarithms: 3.13643

Table C-24. Monitoring data for beta-endosulfan in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.00000	0.09500		HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.04500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00000	0.00000	b	HERZ72

Table C-24. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.00000	0.00000	b	HERZ72
EAST JAVA, BRANTAS DELTA	CAN	17	0.00000	2.40000		GORB71
EAST JAVA, BRANTAS DELTA	PND	17	0.00000	0.08000		GORB71
EAST JAVA, BRANTAS DELTA	RIV	25	0.00000	2.00000		GORB71
EAST JAVA, MADURA SEA	OCE	17	0.00000	0.07000		GORB71
REP. S. AFRICA, KRUGER NATIONAL PARK, LEVUBU RIVER	RIV	65	0.00555	0.00000		VAND78
REP. S. AFRICA, KRUGER NATIONAL PARK, LETABA RIVER	RIV	65	0.00056	0.00000		VAND78
USA, CALIFORNIA	GW	22	0.00000	0.00000	b, c	MADO82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Not detected.

[c] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 35
Number of samples within detection limits: 8
Mean of the highest reported values: 0.58701
Highest of the reported values: 2.40000
Standard deviation: 1.00183
Mean of the natural logarithms: -2.71864
Standard deviation of the natural logarithms: 2.77008

Table C-25. Monitoring data for endrin in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
AUSTRALIA, NAMDI VALLEY, WEE WAA, N.S.W.	CIS	30	0.00000	0.00000	b, c	CUW 74
EGYPT, GIZA, NILE RIVER	RIV	1	0.70000	0.00000		OSMA80B
EGYPT, GIZA	TAP	1	1.50000	0.00000		OSMA80B
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	d	0.00000	0.00000	e	PURN77
INDIA, SATHIAR RESERVOIR	RES	2	0.00430	0.00600		KANN79
INDIA, SATHIAR RESERVOIR	RES	12	0.00000	0.00600		KANN79
INDIA, SATHIAR RESERVOIR	RES	1	0.00330	0.00000		KANN79
ISRAEL, LAKE KINNERET	LAK	21	0.00000	0.00000	f	KAHA74
ISRAEL, LAKE KINNERET WATERSHED, DAN RIVER AT FOUNT	RIV	1	0.00000	0.00000	e, f	KAHA74
ISRAEL, JORDAN RIVER	RIV	6	0.00000	0.00100	f	KAHA74
ISRAEL, NESHUSHIM RIVER	RIV	1	0.00000	0.00000	e, f	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	e, f	KAHA74
ISRAEL, LOWER JORDAN RIVER	RIV	1	0.00000	0.00000	e, f	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.00000	0.00000	e, f	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00000	0.00000	e, f	KAHA74
ISRAEL, KISHON RESERVOIR, NORTH	RES	1	0.00000	0.00000	e, f	KAHA74
ISRAEL, KISHON RESERVOIR, SOUTH	RES	1	0.00000	0.00000	f	KAHA74
ISRAEL, GEVAT RESERVOIR	RES	3	0.00000	0.00070	f	KAHA74
ISRAEL, GEVAT RESERVOIR (ENTRANCE)	RES	4	0.00000	0.00900	f	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00000	0.00000	e, f	KAHA74
ITALY, PO RIVER	RIV	18	0.00000	0.00000	e, g	GALA81
ITALY, ADIGE RIVER	RIV	18	0.00000	0.00000	e, g	GALA81
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.05000		POLE83

Table C-25. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	e	GREI78A
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	e	GREI78B
REP. S. AFRICA, TRANSVAAL, HARTBEESPOORT DAM	LAK	1	0.00000	0.00000	e	GREI77
REP. S. AFRICA, CAPE PROVINCE, VOELVLEI DAM	LAK	1	0.00000	0.00000	e	GREI77
USA, CALIFORNIA	GW	22	0.00000	0.00000	e, h	MADO82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Average detected <0.10 ppb.
[c] From roof tanks in town.
[d] Uncertain.
[e] Not detected.
[f] Detection limit <1 ng/L.
[g] Detection limit = 5 ng/L.
[h] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 28
Number of samples within detection limits: 9
Mean of the highest reported values: 0.25289
Highest of the reported values: 1.50000
Standard deviation: 0.52047
Mean of the natural logarithms: -4.19681
Standard deviation of the natural logarithms: 2.70096

Table C-26. Monitoring data for EPN in water.

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
USA, CALIFORNIA	GW	27	0.00000	0.00000	b, c	MAD082
USA, CALIFORNIA	GW	27	0.00000	0.00000	b, c	MAD082

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Not detected.

[c] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 2
Number of samples within detection limits: 0

Table C-27. Monitoring data for fluometuron in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
PUERTO RICO	RNF	b	540.00000	0.00000	c	WEIS80
PUERTO RICO	RNF	b	150.00000	0.00000	d	WEIS80
TEXAS	RNF	1	60.00000	0.00000	c	WEIS80
TEXAS	RNF	1	60.00000	0.00000	d	WEIS80
MISSISSIPPI	RNF	1	290.00000	0.00000	c	WEIS80
MISSISSIPPI	RNF	1	160.00000	0.00000	d	WEIS80

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Uncertain.

[c] Sample from within a treated plot.

[d] Sample taken 1 mile downslope from treated plot.

Statistics:
Number of locations sampled: 6
Number of samples within detection limits: 6
Mean of the highest reported values: 210.00000
Highest of the reported values: 540.00000
Standard deviation: 182.42807
Mean of the natural logarithms: 5.03936
Standard deviation of the natural logarithms: 0.86649

Table C-28. Monitoring data for fluridone in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
PANAMA CANAL, LAKE GATUN	LAK	b	0.00000	10.00000	c	WEST83
PANAMA CANAL, LAKE GATUN	LAK	70	0.00000	50.00000	c	WEST79

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Uncertain.

[c] Detection limit = 0.001 to 0.0005 ppm.

Statistics:
Number of locations sampled: 2
Number of samples within detection limits: 2
Mean of the highest reported values: 30.00000
Highest of the reported values: 50.00000
Standard deviation: 28.28427
Mean of the natural logarithms: 3.10731
Standard deviation of the natural logarithms: 1.13805

Table C-29. Monitoring data for heptachlor in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ARGENTINA, PARANA RIVER, 600 KM ABOVE THE MOUTH	RIV	14	0.00000	0.03000		LENA84
EGYPT, MAHMOUDIEH CANAL	SW	1	0.70000	0.00000		ELSE79
EGYPT, EL-SOYOUF WATER TREATMENT PLANT	SW	1	0.10000	0.00000		ELSE79
EGYPT, MAHMOUDIEH	TAP	1	0.12000	0.00000		ELSE79
EGYPT, ABEES	WST	1	0.19000	0.00000		ELSE79
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.00000	0.02000		HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00000	0.01000		HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.00000	0.20500		HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.05500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	b	HERZ72

Table C-29. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.02000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00000	0.03000		HERZ72
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.00000	0.00000	b	HERZ72
ISRAEL, LAKE KINNERET	LAK	21	0.00000	0.00000	c	KAHA74
ISRAEL, LAKE KINNERET WATERSHED, DAN RIVER AT FOUNT	RIV	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, JORDAN RIVER	RIV	6	0.00000	0.00060	c	KAHA74
ISRAEL, NESHUSHIM RIVER	RIV	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	b, c	KAHA74
ISRAEL, LOWER JORDAN RIVER	RIV	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, BEL-NOTAFA RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, KISHON RESERVOIR, NORTH	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, KISHON RESERVOIR, SOUTH	RES	3	0.00000	0.00000	b, c	KAHA74
ISRAEL, GEVAT RESERVOIR	RES	3	0.00000	0.00000	b, c	KAHA74
ISRAEL, GEVAT RESERVOIR ENTRANCE	RES	4	0.00000	0.00000	b, c	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74

Table C-29. (Continued)

Location	Water type[a]	No. of samples	Reported values (μg/L) Average	Maximum	Comments	Reference
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ITALY, PO RIVER	RIV	18	0.00000	0.00000	b, d	GALA81
ITALY, ADIGE RIVER	RIV	18	0.00000	0.00000	b, d	GALA81
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.0100C	0.13000		POLE83
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	b	GREI78A
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	b	GREI78B

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Not detected.

[c] Detection limit <1 ng/L.

[d] Detection limit = 1 ng/L.

Statistics:
Number of locations sampled: 64
Number of samples within detection limits: 13
Mean of the highest reported values: 0.12389
Highest of the reported values: 0.70000
Standard deviation: 0.18510
Mean of the natural logarithms: -3.06333
Standard deviation of the natural logarithms: 1.76001

Table C-30. Monitoring data for heptachlor epoxide in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.02500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.03500	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.04000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.00000	0.00000	b	HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00000	0.00000	b	HERZ72

Table C-30. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.00000	0.00000	b	HERZ72
ISRAEL, LAKE KINNERET	LAK	21	0.00000	0.00000	c, d	KAHA74
ISRAEL, LAKE KINNERET WATERSHED, DAN RIVER AT FOUNT	RIV	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, JORDAN RIVER	RIV	6	0.00000	0.00000	b, c	KAHA74
ISRAEL, NESHUSHIM RIVER	RIV	11	0.00000	0.00000	b, c	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	b, c	KAHA74
ISRAEL, JORDAN RIVER (LOWER)	RIV	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, BEL-NOTAFA RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, KISHON RESERVOIR, NORTH	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, KISHON RESERVOIR, SOUTH	RES	3	0.00000	0.00000	b, c	KAHA74
ISRAEL, GEVAT RESERVOIR	RES	3	0.00000	0.00000	b, c	KAHA74
ISRAEL, GEVAT RESERVOIR (ENTRANCE)	RES	4	0.00000	0.00000	b, c	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74
ISRAEL, COASTAL AQUIFER	GW	1	0.00000	0.00000	b	LAHA74

Table C-30. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
ITALY, PO RIVER	RIV	18	0.00000	0.00000	b, e	GALA81
ITALY, ADIGE RIVER	RIV	18	0.00000	0.00000	b, e	GALA81
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	5	0.00000	0.02000		POLE83
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	b	GREI78A
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	b	GREI78B
USA, CALIFORNIA	GW	22	0.00000	0.00000	b, f	MADO82

[a] Water Types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Not detected.

[c] Detection limit <1 ng/L.

[d] Found in one sample, concentration uncertain.

[e] Detection limit = 2 ng/L.

[f] Detection limit = 5 ppb.

Statistics:
Number of locations sampled: 60
Number of samples within detection limits: 4
Mean of the highest reported values: 0.03000
Highest of the reported values: 0.04000
Standard deviation: 0.00913
Mean of the natural logarithms: -3.54304
Standard deviation of the natural logarithms: 0.31561

Table C-31. Monitoring data for hexachlorobenzene in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
BELGIUM, EYSDEN, RIVER MEUSE	RIV	b	0.00000	0.01000		WEGM78
GERMANY, BELLINGEN, RHINE RIVER	RIV	b	0.02000	0.00000		WEGM78
GERMANY, ARTZENHEIM, RHINE RIVER	RIV	b	0.04000	0.00000		WEGM78
GERMANY/FRANCE, STRASBOURG, RHINE RIVER	RIV	b	0.03000	0.00000		WEGM78
GERMANY, KARLSRUHE, RHINE RIVER	RIV	b	0.05000	0.00000		WEGM78
GERMANY, LUDWIGSHAFEN, RHINE RIVER	RIV	b	0.03000	0.00000		WEGM78
GERMANY, MAINZ, RHINE RIVER	RIV	b	0.04000	0.00000		WEGM78
GERMANY, LEVERKUSEN, RHINE RIVER	RIV	b	0.03000	0.00000		WEGM78
GERMANY, DUISBURG, RHINE RIVER	RIV	b	0.04000	0.00000		WEGM78
ITALY, MEDITERRANEAN SEA	OCE	67	0.00000	0.00001		PUCC80
ITALY, MEDITERRANEAN SEA	OCE	20	0.00000	0.00000	c	PUCC80
ITALY, MEDITERRANEAN SEA	OCE	4	0.00000	0.00000	c	PUCC80
NETHERLANDS/GERMANY, LOBITH, RHINE RIVER	RIV	b	0.06000	0.00000		WEGM78
NETHERLANDS, ROTTERDAM, RHINE RIVER	RIV	b	0.01000	0.00000		WEGM78
NETHERLANDS/GERMANY, LOBITH, RHINE RIVER	RIV	b	0.00000	0.14000		WEGM78
SWITZERLAND, RHEINFELDEN, RHINE RIVER	RIV	b	0.00000	0.00000		WEGM78
SWITZERLAND, BASEL, RHINE RIVER	RIV	b	0.04000	0.00000		WEGM78

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Uncertain.

[c] Not detected.

Statistics:
Number of locations samples: 17
Number of samples within detection limits: 14
Mean of the highest reported values: 0.03857
Highest of the reported values: 0.14000
Standard deviation: 0.03348
Mean of the natural logarithms: -3.98612
Standard deviation of the natural logarithms: 2.26861

Table C-32. Monitoring data for malathion in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	b	0.01000	0.00000		GREV72
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	b	0.01000	0.00000		GREV72
INDIA, CALCUTTA	GW	4	0.00000	0.00000	c	MUKH80
INDIA, CALCUTTA GANGES RIVER	RIV	2	0.00000	0.00000	c	MUKH80
INDIA, CALCUTTA	SW	2	0.00000	0.00000	c	MUKH80
INDIA, CALCUTTA	PND	2	1600.00000	0.00000		MUKH80
ISRAEL, LAKE KINNERET	LAK	18	0.30200	0.00000	d	KAHA74
ISRAEL, JORDAN RIVER	RIV	6	0.00000	0.00000	c, d	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	3	0.00000	0.00000	c, d	KAHA74
ISRAEL, JORDAN RIVER (LOWER)	RIV	1	0.00000	0.00000	c, d	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	1	0.00000	0.00000	c, d	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00000	0.00000	c, d	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	1	0.00000	0.00000	c, d	KAHA74
USA, CALIFORNIA	GW	27	0.00000	0.00000	c, e	MADD82
VIRGIN ISLANDS, ST. THOMAS	CIS	15	0.00000	0.14000		LENO72
VIRGIN ISLANDS, ST. JOHN	CIS	14	0.00000	0.01000		LENO72

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.
[b] Uncertain.
[c] Not detected.
[d] Detection limit <1 ng/L.
[e] Detection limit = 5 ppb.

Statistics:
Number of locations sampled: 16
Number of samples within detection limits: 6
Mean of the highest reported values: 266.74533
Highest of the reported values: 1600.00000
Standard deviation: 653.15874
Mean of the natural logarithms: -1.60014
Standard deviation of the natural logarithms: 4.64744

Table C-33. Monitoring data for methoxychlor in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	b	GREI78A
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	b	GREI78B
REP. S. AFRICA, TRANSVAAL, HARTBEESPOORT DAM	LAK	1	0.00000	0.00000	b	GREI77
REP. S. AFRICA, CAPE PROVINCE, VOELVLEI DAM	LAK	1	0.00000	0.00000	b	GREI77
USA, CALIFORNIA	GW	22	0.00000	0.00000	b, c	MAD082

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Not detected.

[c] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 5
Number of samples within detection limits: 0

Table C-34. Monitoring data for mevinphos in water.

Location	Water type[a]	No. of samples	Reported values (μg/L) Average	Maximum	Comments	Reference
AUSTRALIA, NAMOI VALLEY, WEE WAA, N.S.W.	CIS	30	0.00000	0.00000	b, c	OUW 74
USA, CALIFORNIA	GW	27	0.00000	0.00000	d, e	MAD082

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Average detected< 0.10 ppb.

[c] From roof tanks in town.

[d] Not detected.

[e] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 2
Number of samples within detection limits: 0

Table C-35. Monitoring data for oxadiazon in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
JAPAN, KITAKYUSHU DISTRICT, MURASAKI RIVER	RIV	11	0.00000	1.08000		YAMA80A
JAPAN, KITAKYUSHU DISTRICT, HIGASHITANI RIVER	RIV	11	0.00000	1.95000		YAMA80A
JAPAN, KITAKYUSHU DISTRICT, NISHITANI RIVER	RIV	11	0.00000	1.16000		YAMA80A
JAPAN, KITAKYUSHU DISTRICT, TONDA RESERVOIR	SW	11	0.00000	0.30000		YAMA80A
JAPAN, KITAKYUSHU DISTRICT, ONGA RIVER	RIV	11	0.00000	0.45000		YAMA80A
JAPAN, TOBATA-KU, KITAKYUSHU	TAP	11	0.00000	0.10000		YAMA80A

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

Statistics:
Number of locations sampled: 6
Number of samples within detection limits: 6
Mean of the highest reported values: 0.84000
Highest of the reported values: 1.95000
Standard deviation: 0.69042
Mean of the natural logarithms: -0.56864
Standard deviation of the natural logarithms: 1.08838

Table C-36. Monitoring data for parathion in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ARGENTINA, PARANA RIVER, 600 KM ABOVE THE MOUTH	RIV	14	0.02200	0.06500	b	LENA84
ARGENTINA, SALADO RIVER	RIV	6	0.02700	0.00000		LENA84
ARGENTINA, PARQUE GENERAL, BELGRANO LAKE	LAK	14	0.03400	0.00000		LENA84
ARGENTINA, SETUBAL LAKE	LAK	14	0.04300	0.00000		LENA84
AUSTRALIA, NAMOI VALLEY, WEE WAA, N.S.W.	CIS	30	0.00000	0.00000	c	OUW 74
FED. REPUBLIC OF GERMANY, HAMBURG, ELBE RIVER	RIV	12	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, LAUENBURG, ELBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BREMEN, WESER RIVER	RIV	15	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ACHIM, WESER RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, DUSSELDORF, RHINE RIVER	RIV	11	0.00000	0.05500		HERZ72
FED. REPUBLIC OF GERMANY, KARLSRUHE, RHINE RIVER	RIV	15	0.00000	0.00500		HERZ72
FED. REPUBLIC OF GERMANY, WESEL, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ST. GOAR, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, OESTRICH, RHINE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, JOCHENSTEIN, DANUBE RIVER	RIV	15	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ULM, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, INGOLSTADT, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, GEISINGEN, DANUBE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RENDSBURG, NORDOSTSEEKANAL	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BRAMSCHE, MITTELLANDKANAL	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RHEINE, EMS RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, DUISBURG, RUHR RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, SIEGBURG, SIEG RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, FACHBACH, LAHN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, KOBLENZ, MOSELLE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, RAUNHEIM, MAIN RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BAD BERNECK, MAIN RIVER	RIV	1	0.00000	0.00000	d	HERZ72

Table C-36. (Continued)

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
FED. REPUBLIC OF GERMANY, HEIDELBERG, NECKAR RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, LANGENARGEN, LAKE CONSTANCE	LAK	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, ERLANGEN, REGNITZ RIVER	RIV	1	0.00000	0.00000		HERZ72
FED. REPUBLIC OF GERMANY, HOF, SAALE RIVER	RIV	1	0.00000	0.00000	d	HERZ72
FED. REPUBLIC OF GERMANY, BERLIN-GATOW, HAVEL RIVER	RIV	15	0.00000	0.00000	d	HERZ72
F.R.G., BERLIN-LICHTERFELDE, TELTOWKANAL	RIV	15	0.00000	0.06500		HERZ72
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	e	0.03000	0.00000		GREV72
NETHERLANDS/GERMANY/SWITZERLAND, RHINE RIVER	RIV	e	0.07000	0.00000		GREV72
INDIA, SATHIAR RESERVOIR	RES	2	0.00400	0.00430		KANN79
INDIA, SATHIAR RESERVOIR	RES	12	0.00000	0.00900		KANN79
INDIA, SATHIAR RESERVOIR	RES	1	0.00340	0.00000		KANN79
USA, CALIFORNIA	GW	27	0.00000	0.00000	d, f	MADO82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Standard deviation of samples = 22.70 ng/L.

[c] From roof tanks in town.

[d] Not detected.

[e] Uncertain.

[f] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 39
Number of samples within detection limits: 12
Mean of the highest reported values: 0.03423
Highest of the reported values: 0.07000
Standard deviation: 0.02539
Mean of the natural logarithms: -3.81787
Standard deviation of the natural logarithms: 1.14605

Table C-37. Monitoring data for methylparathion in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ARGENTINA, PARANA RIVER, 600 KM ABOVE THE MOUTH	RIV	14	0.00000	0.17400		LENA84
EGYPT, PORT-SAID MED. SEA, N SUEZ CANAL ENTRANCE	OCE	18	1.00000	96.00000	b, c	BADA84
INDIA, MYSORE DISTRICT	d	13	0.00000	1300.00000		RAJU82
USA, CALIFORNIA	GW	27	0.00000	0.00000	e, f	MADD82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Detection limit = 0.1 µg/L.

[c] Accidental spill.

[d] Uncertain.

[e] Not detected.

[f] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 4
Number of samples within detection limits: 3
Mean of the highest reported values: 465.39133
Highest of the reported values: 1300.00000
Standard deviation: 724.37861
Mean of the natural logarithms: 3.32866
Standard deviation of the natural logarithms: 4.58612

Table C-38. Monitoring data for phosphamidon in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
IRAN	PAD	80	0.00000	110.00000		TEIN79
USA, CALIFORNIA	GW	27	0.00000	0.00000	b, c	MADD82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Not detected.

[c] Detection limit = 5 ppb.

Statistics:
Number of locations sampled: 2
Number of samples within detection limits: 1

Table C-39. Monitoring data for toxaphene in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
AUSTRALIA, NAMOI VALLEY, WEE WAA, N.S.W.	CIS	30	0.00000	0.00000	b, c	OUW 74
KENYA, NAKURU NATIONAL PARK, LAKE NAKURU	LAK	1	0.00000	0.00000	d	GREI78A
KENYA, NZOIA RIVER CATCHMENT	RIV	11	0.00000	0.00000	e	KALL77
KENYA, NZOIA RIVER CATCHMENT	RIV	13	0.00000	0.00000	f	KALL77
KENYA, LAKE NAKURU	LAK	9	0.00000	0.00000	e	KALL77
KENYA, LAKE ELEMENTEITA	LAK	9	0.00000	0.00000	e	KALL77
KENYA, LAKE NAIVASHA	LAK	9	0.00000	0.00000	e	KALL77
KENYA, MALEWA RIVER	RIV	9	0.00000	0.00000	e	KALL77
KENYA, GILGIL RIVER	RIV	9	0.00000	0.00000	e	KALL77
RHODESIA, LAKE MCILWAINE	LAK	1	0.00000	0.00000	d	GREI78B
REP. S. AFRICA, TRANSVAAL, HARTBEESPOORT DAM	LAK	1	0.00000	0.00000	d	GREI77
REP. S. AFRICA, CAPE PROVINCE, VOELVLEI DAM	LAK	1	0.00000	0.00000	d	GREI77
USA, ALABAMA, HARTSELLE, FLINT CREEK	CRK	13	0.00700	0.41000		NICH64
USA, WISCONSIN, OTTMAN LAKE	LAK	1	2.20000	0.00000		HUGH70
USA, WISCONSIN, OTTMAN LAKE	LAK	2	2.10000	13.70000		HUGH70
USA, MISSISSIPPI VALLEY WATERSHED	RNF	6	7.50000	20.90000		WILL83
USA, CALIFORNIA	GW	22	0.00000	0.00000	d, h	MADD82
USA, LAKE HURON	LAK	9	0.00050	0.00210		SWAI82

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Average detected <0.10 ppb.

[c] From roof tanks in town.

[d] Not detected.

[e] Average detected <20.00 ppb.

[f] Average detected <0.50 ppb.

[g] Uncertain.

[h] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 18
Number of samples within detection limits: 5
Mean of the highest reported values: 7.44242
Highest of the reported values: 20.90000
Standard deviation: 9.38829
Mean of the natural logarithms: -0.12227
Standard deviation of the natural logarithms: 3.72309

Table C-40. Monitoring data for trifluralin in water.

Location	Water type[a]	No. of samples	Reported values (µg/L) Average	Maximum	Comments	Reference
ISRAEL, LAKE KINNERET	LAK		0.00000	0.00000	b, c	KAHA74
ISRAEL, JORDAN RIVER	RIV		0.00000	0.00000	b, c	KAHA74
ISRAEL, LAKE KINNERET WATERSHED	DRN	[illegible]	0.00000	0.00000	b, c	KAHA74
ISRAEL, JORDAN RIVER (LOWER)	RIV	[illegible]	0.00000	0.00000	b, c	KAHA74
ISRAEL, YASUOR RESERVOIR	RES	[illegible]	0.00000	0.00000	b, c	KAHA74
ISRAEL, KISHON RESERVOIR	RES	1	0.00000	0.00000	b, c	KAHA74
ISRAEL, ZOHAR RESERVOIR	RES	[illegible]	0.00000	0.00000	b, c	KAHA74
USA, MISSISSIPPI VALLEY WATERSHED	RNF	6	0.10000	0.80000		WILL83

[a] Water types: BKK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Not detected.

[c] Detection limit < 1 ng/L.

Statistics:
Number of locations sampled: 8
Number of samples within detection limits: 1

Table C-41. Monitoring data for trithion in water.

Location	Water type[a]	No. of samples	Reported values (µg/L)			Reference
			Average	Maximum	Comments	
USA, CALIFORNIA	GW	27	0.00000	0.00000	b, c	MAD082
USA, CALIFORNIA	GW	27	0.00000	0.00000	b, c	MAD082

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern;
CRK = creek; DRN = drainage; GW = ground water; LAK = lake;
OCE = ocean; PAD = paddy; PND = pond; RES = reservoir;
RIV = river; RNF = runoff; SW = surface water; TAP = tap water;
WST = waste water.

[b] Not detected.

[c] Detection limit = 5.0 ppb.

Statistics:
Number of locations sampled: 2
Number of samples within detection limits: 0

Table C-42. Pesticides for which monitoring data were reported only once in the literature.

Location	Water type[a]	Substance	No. of samples	Reported values (µg/L) Maximum	Comments	Reference
USA, CALIFORNIA	GW	1,3-D	54	0.00000	b, c	MADD82
USA, CALIFORNIA	GW	BAYTEX [FENTHION]	27	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	BOTRAN [DCNA]	22	0.00000	b, d	MADD82
TAIWAN, TEH-CHI WATERSHED	RIV	CAPTAFOL	69	0.00000	e	WONG83
TAIWAN, TEH-CHI WATERSHED	RIV	CHLOROBENZILATE	69	0.00000	e	WONG83
USA, CALIFORNIA	GW	DACTHAL [DCPA]	22	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	DASANIT [FENSULFOTHION]	27	0.00000	b, d	MADD82
INDONESIA, JAKARTA, SAMARANG, SURABAYA	RIV	DDMU	2	0.02000		PURN77
USA, CALIFORNIA	GW	DEF	27	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	DCLNAV	27	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	DISYSTON [DISULFOTON]	27	0.00000	b, d	MADD82
AUSTRALIA, NAMOI VALLEY, WEE WAA, N.S.W.	CIS	DICHLORVOS	30	0.00000	e, f	MUM74
USA, CALIFORNIA	GW	DURSBAN [CHLORPYRIFOS]	27	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	DYFONATE [FONOFOS]	27	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	DYLOX [TRICHLOROFON]	27	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	ENDOSULFAN III	22	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	FOLEX [MERPHOS]	27	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	GUTHION [AZINPHOSMETHYL]	27	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	IMIDAN [PHOSMET]	27	0.00000	b, d	MADD82
USA, CALIFORNIA	GW	KELTHANE [DICOFOL]	22	0.00000	b, d	MADD82
INDONESIA, JEPARA	BRK	LEPTOPHOS	11	13.47000		PURN77
AUSTRALIA, NAMOI VALLEY, WEE WAA, N.S.W.	CIS	MONOCROTOPHOS	30	0.00000	e, f	MUM 74
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	o,p'-DDD	5	0.06000		POLE83
ITALY, COASTAL ARCH N. OF TARANTO, TARA RIVER BASIN	SW	o,p'-DDE	5	0.03000		POLE83
USA, CALIFORNIA	GW	PCNB	22	0.00000	b, d	MADD82
TAIWAN, TEH-CHI WATERSHED	RIV	PCP-NA	69	0.00000	e	WONG83

Table C-42. (Continued)

Location	Water type[a]	Substance	No. of samples	Reported values (µg/L)		Reference
				Maximum	Comments	
USA, CALIFORNIA	GW	PERTHANE [ETHYLAN]	22	0.00000	b, d	MAD082
USA, CALIFORNIA	GW	SUPRACIDE (METHIDATHION)	27	0.00000	b, d	MAD082
USA, CALIFORNIA	GW	TEDION [TETRADIFON]	22	0.00000	b, d	MAD082
USA, CALIFORNIA	GW	THIMET (PHORATE)	27	0.00000	b, d	MAD082
USA, CALIFORNIA	GW	TORAK (DIALIFOR)	27	0.00000	b, d	MAD082
USA, CALIFORNIA	GW	ZOLONE (PHOSALONE)	27	0.00000	b, d	MAD082

[a] Water types: BRK = brackish; CAN = canal; CIS = cistern; CRK = creek; DRN = drainage; GW = ground water; LAK = lake; OCE = ocean; PAD = paddy; PND = pond; RES = reservoir; RIV = river; RNF = runoff; SW = surface water; TAP = tap water; WST = waste water.

[b] Not detected.

[c] Detection limit = 0.1 ppb.

[d] Detection limit = 5.0 ppb.

[e] Average detected < 1.00 ppb.

[f] From roof tanks in town.

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